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LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY. APPENDIX Q. FISH --ETC(U)
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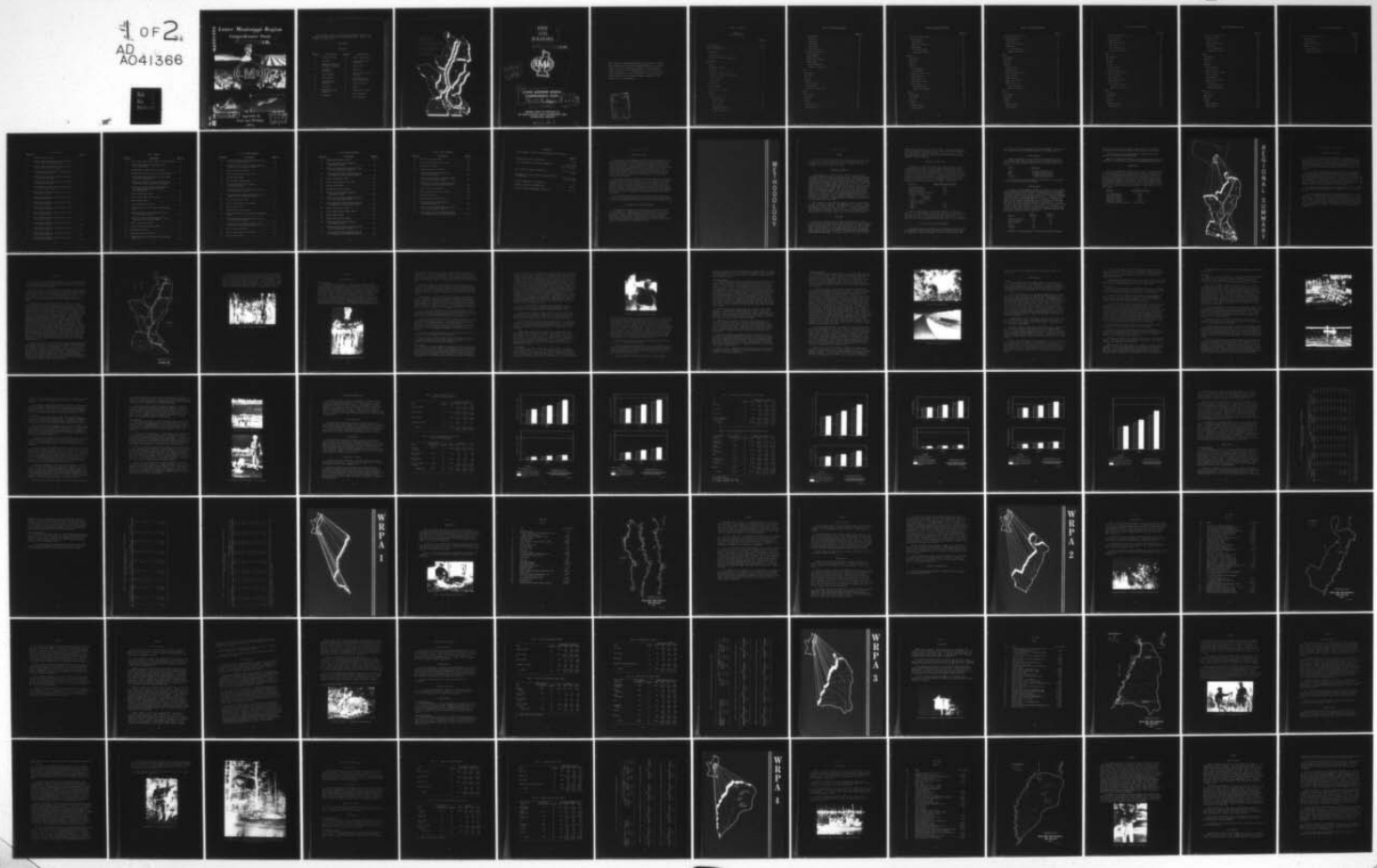

Lower Mississippi Region Comprehensive Study

Appendix Q
Fish and Wildlife
1974

This appendix is one of a series of 22 documents comprising the complete Lower Mississippi Region Comprehensive Study. A list of the documents is shown below.

Main Report

Appendixes

Appendix	Description	Appendix	Description
A	History of Study	K	M and I Water Supply
B	Economics	L	Water Quality and Pollution
C	Regional Climatology, Hydrology & Geology	M	Health Aspects
D	Inventory of Facilities	N	Recreation
E	Flood Problems	O	Coastal and Estuarine Resources
F	Land Resources	P	Archeological and Historical Resources
G	Related Mineral Resources	Q	Fish and Wildlife
H	Irrigation	R	Power
I	Agricultural Land Drainage	S	Sediment and Erosion
J	Navigation	T	Plan Formulation
		U	The Environment

WATER RESOURCES PLANNING AREAS

FISH AND WILDLIFE.

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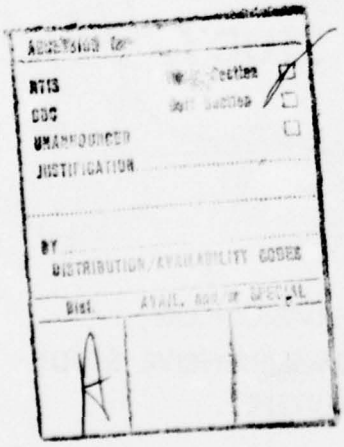
LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY.

Appendix, Q.

PREPARED UNDER THE SUPERVISION OF
THE LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY
COORDINATING COMMITTEE

410 262 LB

This report was prepared at field level by the Lower Mississippi Region Comprehensive Study Coordinating Committee and is subject to review by interested Federal agencies at the departmental level, by Governors of the affected States, and by the Water Resources Council prior to its transmittal to the President of the United States for his review and ultimate transmittal to the Congress for its consideration.



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PHOTOGRAPHS

The photographs included in this appendix were furnished by:

INTRODUCTION

PURPOSE AND SCOPE

The purposes of this appendix are to (1) make an inventory of fish and wildlife resources including terrestrial and aquatic habitats and related environmental factors for the Lower Mississippi Region and for each of the 10 water resource planning areas (WRPA's) into which the region was divided for planning purposes; (2) determine present hunting, fishing, and nonconsumptive use of the fish and wildlife resource; (3) determine hunting, fishing, and other fish and wildlife needs for future time periods of 1980, 2000, and 2020; and (4) assess fish and wildlife resources as related to or influenced by existing land and water resource programs.

This study utilized available basic data and exchange of technical data among Federal and State agencies. It covers only areas and species dependent upon or affected by fresh water. Descriptions of fish and wildlife resources include discussion of species, general extent and quality of habitats, fishing and hunting use, and factors affecting biological resources. Material is presented for fish and wildlife groups in sufficient detail to identify essential habitat and critical problems, and to show differences among the 10 hydrologic planning areas within the region.

The estimates of future needs for fish and wildlife resources are expressed for fishing and hunting use, based on the 1970 National Survey of Fishing and Hunting and the present and projected human population.

RELATIONSHIP TO OTHER APPENDIXES

This appendix, together with other appendixes, provides the base for development of a comprehensive water resource plan for the Lower Mississippi Region. Human population projections were obtained from Appendix B, Economics, and inventories of land and water resources were obtained from Appendix F, Land Resources. The water-related needs for preserving and/or enhancing the coastal and estuarine zone are presented in Appendix O, Coastal and Estuarine.

METHODOLOGY

METHODOLOGY

GENERAL

For this study it was necessary to relate need based on political boundary lines to supply (habitat) based on hydrologic boundaries. The discrepancies associated with such a choice are rather small and the assumption was made to neglect this error.

INVENTORY OF HABITAT

The usefulness of terrestrial areas providing wildlife habitat varies with vegetative cover and related factors. Bearing in mind this variability, all acres of forest land and wetland are considered usable by wildlife; however, only a little over one-half of the total pasture-land and about one-third of total cropland were counted as a usable wildlife resource in defining resource availability for the year 1970. The inventories of water and land resources were available from the Land Resources Appendix, except stream, pond, estuarine, and wetland habitat. Miles of stream habitat suitable for sport fishing were determined by a complex map sampling procedure. The procedure was checked for reliability in 2 of the 10 WRPA's where participating State game and fish agencies had inventories, and the sampling method proved reliable. An inventory of pond habitat was not available; therefore, the existing acreages were estimated. Estuarine habitat acreages were obtained from the Louisiana Coastal Area Study.

The assumption was made that the quality of the fish and wildlife resources will remain constant. The capability of a resource to supply hunting and fishing is directly related to the quality of that resource. Any degradation in quality will be reflected in a reduced potential to provide hunting or fishing. Quality of habitat is determined by distribution, age, soil fertility, usage, multiple-uses, and other factors.

USER DATA

Only sparse user data were available for the 1970 use of the region's fish and wildlife resources. Therefore, 1970 needs were projected as were future needs. Where use data were available, it compared favorably with projected needs. Needs were projected for two sets of conditions. One set relates to the formulation of plans for a development program (Program A), which stresses the National Income Objective under the assumption that future socioeconomic growth of the region will lag

behind national growth, as it has in the past. The other (Program B) stresses regional development, with the rate of socioeconomic growth for the region equal to that for the Nation. Alternative plans and programs formulated on the basis of the projected needs are discussed in Appendix T, Plan Formulation.

PROJECTION OF USER NEEDS

Projections of angler-day, hunter-day, and user-day of wildlife-oriented recreation needs are based on human population projections from Appendix B, Economics, and participation rates obtained from the 1970 National Survey of Fishing and Hunting. Participation rates of persons 12 years of age and older were applied to population projections of persons 12 years of age and over. Participation rates used in this study are the average of the East South Central Divisions of the Survey composed of the States of Texas, Oklahoma, Arkansas, Louisiana, Kentucky, Tennessee, Mississippi and Alabama, as shown below:

Activity	Annual Man-Days Per Capita
Big Game Hunting	0.43
Small Game Hunting	1.41
Waterfowl Hunting	0.18
Wildlife-Oriented Recreation	0.70
Freshwater Fishing	5.42
Stream - 31 percent	
Lake - 48 percent	
Pond - 21 percent	
Saltwater Fishing	
WRPA 2,3,4,5,6, & 7	0.32
WRPA 8	2.07
WRPA 9	1.20
WRPA 10	2.76

Based on regional data from the participating fish and game agencies, the total freshwater fishing was further allocated to stream, lake, and pond categories according to the percentages shown above. Due to the location of saltwater habitat, participation rates from the Louisiana Coastal and Atchafalaya Basin Studies were used as shown above.

PROJECTION OF HABITAT REQUIREMENTS

The needs in terms of user-days were translated into needs in terms of habitat required to satisfy the demand at a minimum level or quality experience. Habitat requirements in terms of acres or miles per

user-day per year were estimated based on fish and game carrying capacities determined by the participating State fish and game agencies.

Water Resources

Habitat requirements for sport fishing were determined by the participating State game and fish agencies. The habitat capabilities based on a minimum acceptable quality fishing experience used in this study were:

Habitat	Capability
Stream	733 angler-days/mile/year
Lake	33 angler-days/acre/year
Pond	20 angler-days/acre/year
Estuarine	6 angler-days/acre/year

Freshwater and estuarine commercial fishing needs were furnished by the National Marine Fisheries Service.

Land Resources

Big game is hunted primarily on forest land (and by local residents in the marshlands of several coastal Louisiana parishes) and averaged 100 man-days per 1,000 acres in 1970. Participation rates and resource availability were derived from data compiled in 1970 and for convenience were projected as constants through the year 2020. To properly reflect changes in land use, participation rates, and resource availability, water resource planners should update these constants as new national and basin-wide surveys and publications are made available. The need for forest land was allocated to the four forest types based on the percentage of these types currently in public control. Accordingly, 55, 27, 15, and 3 percent were allocated to bottomland hardwoods, upland hardwoods, pine hardwood, and pine, respectively. Hunting capacities (man-days/1,000 acres) used in this study were:

Habitat	Hunting Capacity	Productive Capacity
Bottomland Hardwoods	200	400
Upland Hardwoods	125	175
Pine Hardwoods	75	100
Pine	25	30
Cropland	230	-
Pasture	100	-

Waterfowl is hunted primarily on openland (wetland and flooded

cropland) and forest land (seasonally flooded bottomland hardwoods) with capacities of 400 and 20 man-days per 1,000 acres respectively.

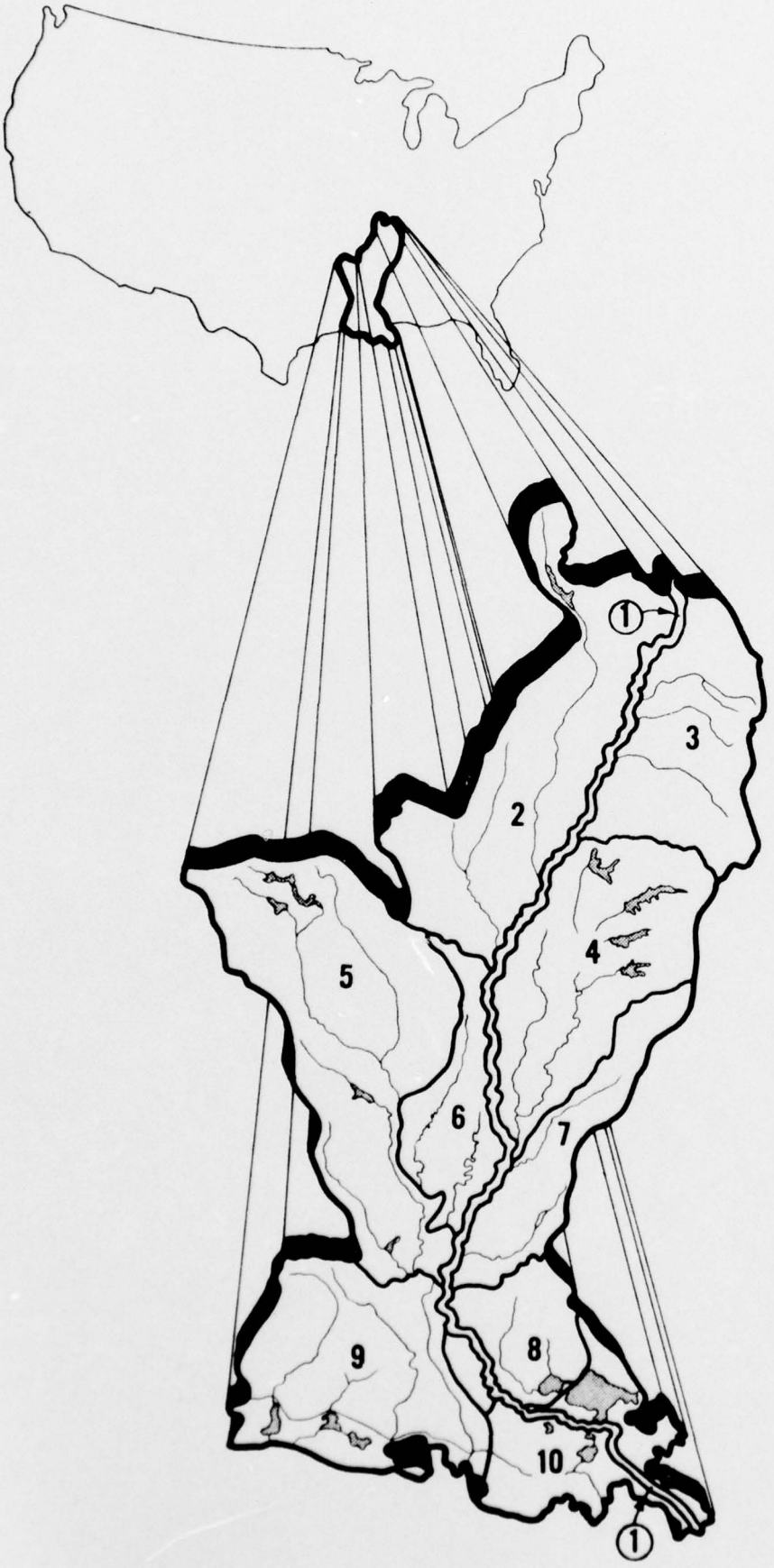
No attempt was made to quantify habitat requirements for non-consumptive wildlife-oriented recreation.

Data on fur animals were furnished by the participating States and projections of future needs were based on human population projections.

EXPENDITURES

The per day expenditures for the various types of fish and wildlife activities covered in this study were taken from the 1972 National Survey of Fishing and Hunting. These reflect the average expenditures of the East South Central and West South Central Divisions of the Survey, and include expenditures for items such as fishing and hunting equipment, auxiliary equipment, guides, boats, motors, dogs, food, lodging, transportation, licenses, privilege fees, etc. These expenditures do not indicate the value of a user-day, rather they only state the dollar input to the economy by hunters and fishermen. Expenditures are outlined below:

Activity	Expenditure/user-day
Big Game Hunting	$17.65
Small Game Hunting	6.60
Waterfowl Hunting	5.40
Freshwater Fishing	6.85
Saltwater Fishing	10.35
Wildlife-Oriented Recreation	Not Available



REGIONAL SUMMARY

REGIONAL SUMMARY

DESCRIPTION OF REGION

The Lower Mississippi Region includes the drainage area of the Mississippi River below the mouth of the Ohio, except for the White, Arkansas, and Red Rivers above the effects of Mississippi River backwater; the Louisiana Coastal Area between the drainage divides of the Pearl and Sabine Rivers; and the flood-protected area at Cairo, Ill. All of the Louisiana coastal marshes are considered to be within the region.

The hydrologic boundary of the region encompasses approximately 65.5 million acres, or 102.4 thousand square miles of land and water area in the south-central portion of the continental United States. The drainage area stretches over sections of seven states from the mouth of the Ohio River to the Gulf of Mexico. It extends about 600 miles in a north-south direction and varies in width from 100 to 300 miles. The region is entirely within the Central Gulf Coastal Plain except for the Ouachita Mountain area in southeastern Arkansas (figure 1).

The region's topography varies from rugged features of the Ouachita and Ozark Mountains to the nearly level floodplain of the Mississippi River.

In 1970 the human population of the region was 6,293,233. This population is centered around three major metropolitan areas: Memphis, Baton Rouge, and New Orleans. Future projections indicate these areas will continue to accelerate in growth, while the rural areas grow very slowly. This centralization of population will concentrate the demands on fish and wildlife resources. The region population is projected to increase by 2020 to 10,196,000 and 11,655,000 under Programs A and B, respectively.

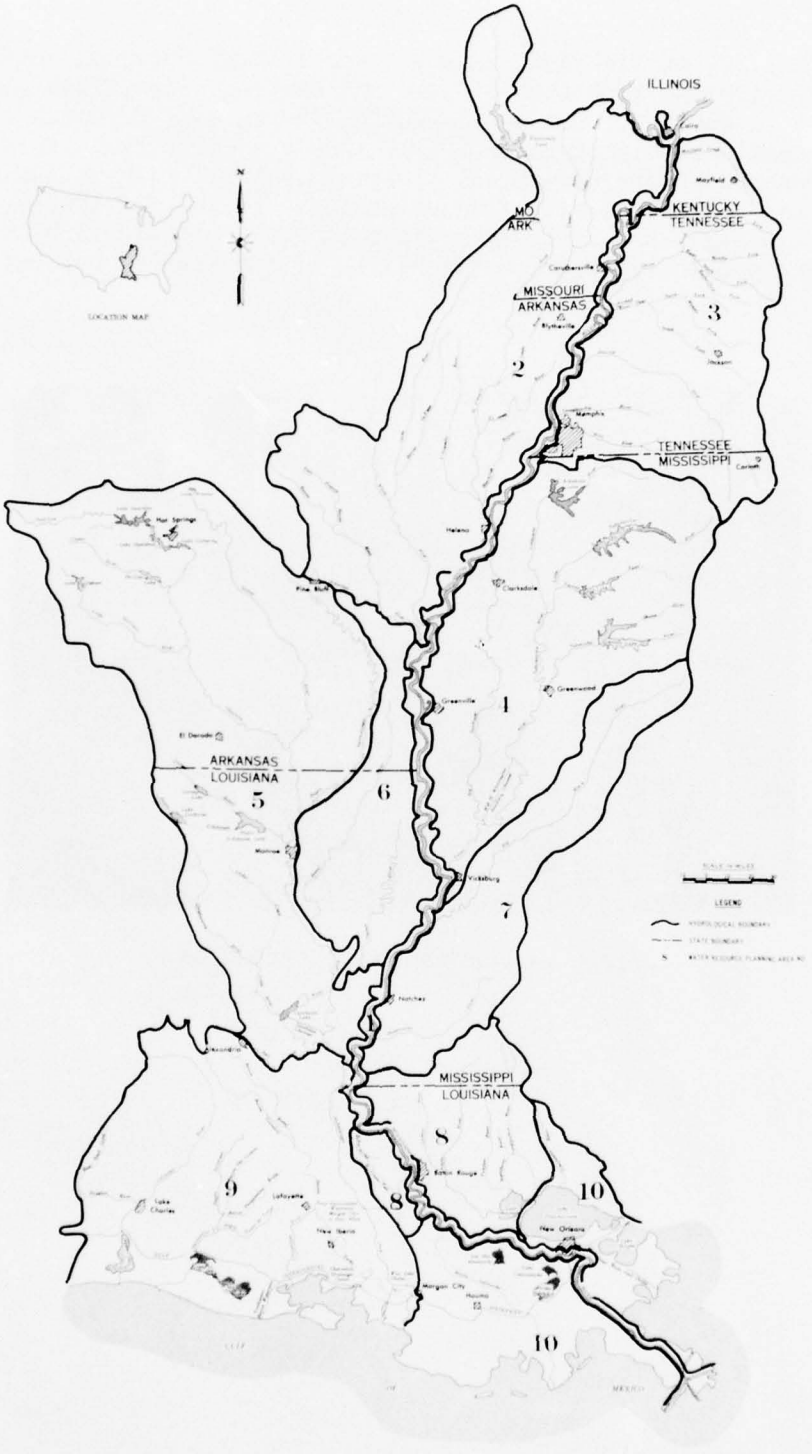
HISTORY

The history of fish and wildlife in this section is concerned with only two aspects; the part fish and wildlife played in the settlement of the area, and the role man has played in the status of fish and wildlife since he initiated settlement.

The first discovery of the lower Mississippi Valley was probably in 1528 when a Spanish explorer, Narvaez, discovered freshwater outflow into the Gulf of Mexico. He was followed by DeSoto in 1529, but it was not until 1543 that DeSoto traveled down the Mississippi River. In 1682, LaSalle, a French explorer, traveled the Mississippi River. Others followed, and eventually more and more people moved into the valley.

Early explorers were seeking furs, hides, and bear oil, the earliest commercial products of the region. They found an abundance of beaver, mink, otter, muskrat, deer, buffalo, bear, opossum, raccoon, bobcat, cougar, fox, wolf, and skunk. Fish and wildlife were of utmost importance as a food source for the early settlers. As human populations increased, so did the demand for timber and food products. Large tracts of forest land were cleared and converted to agricultural operations resulting in the loss of wildlife habitat. Game populations went from a high point before settlement to points of near or total elimination during the early 1900's. As market hunters and other commercial users decreased their take because of diminishing supply, sport hunting came into vogue for the wealthy. During those times, a rather large and needless kill was the rule rather than the exception. Large packs of dogs were used to bring game to bay. Sometimes the woods were set on fire to drive game into the range of gunners. Year-round hunting by the local people took a great part of the game, especially the big-game species. Big game such as white-tailed deer, black bear, and wild turkey were nearly eliminated. Many of the small game populations were hunted heavily but had a greater capacity to recover from heavy losses. Species such as mourning dove, quail, and blackbirds actually increased in numbers because agricultural practices provided additional food.

In the early 1900's, State fish and game agencies began regulating game hunting activities. Seasons were set to promote a healthy return of most game species aided by management practices. Active law enforcement curtailed a majority of the poaching. Another major reason for the return of big game in some hill areas was a reduction in the number of small farms. Since the turn of the century, sport hunting has returned to a level of high significance, and is still gaining where repopulation of wildlife species has not been completed. However, bear, buffalo, lion, and wolves have not recovered since the large ranges required by these animals are no longer available.



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

REGIONAL MAP

FIGURE 1

The history of fish and fishing since initial European settlement is vastly different from that of game and hunting. Sportfish populations were at their highest levels during the initial European settlement and continued high into the early 1900's. Early exploiters of the aquatic resources were commercial fishermen. Sport fishing was insignificant and associated with food gathering. In the mid-1900's, flood control, drainage, and navigation projects were initiated, which have reduced the productivity and availability of the fishery habitat.

Early market hunters in Arkansas.

HABITAT

Water Resources

Stream Fishing

The Lower Mississippi Region is noted for its warmwater stream fishing, both sport and commercial. Stream habitat in the region varies from the smallest intermittent stream to the vast Mississippi River. Stream habitat quality varies from the most productive streams providing excellent fishing to streams that provide no appreciable fishing. For this study, streams were divided into those that are "fishable" and those that are not. Based on this methodology, there are presently 7,699 miles of fishable streams in the region providing anywhere from excellent to the least acceptable form of sport fishing, excluding the Mississippi River which provides no appreciable sport fishing. Two distinct stream types in the region (bottomland and upland) support considerably different fish populations. Unaltered bottomland streams are

Fish are abundant throughout the region.

more productive and provide for higher quality fishing experience than upland streams. However, bottomland streams are more susceptible to alteration. Coastal stream habitat has physical and chemical differences which allow both marine and freshwater fish to inhabit the same waters. Marine fish have been found in the Atchafalaya River over 160 miles from sea.

Stream fish sought by sport and commercial fishermen include largemouth and spotted bass; white and black crappie; bluegill, redear, longear, green, and other sunfish; bullhead and other catfish; buffalo, drum, gar, and carp. Many other species of fish are harvested by both sport and commercial stream fishermen but receive little or no specific effort.

Stream habitat is most susceptible to alteration. Stream habitat may be altered by channelization, sediment, and other pollution, primarily man-induced. Channel modification is deleterious to fish populations because it eliminates natural cover, disrupts the food supply, and contributes to warming of the water because of more uniform shallow depths and lack of streamside vegetation. Channelization has been shown to eliminate sport fish in some streams by as much as 95 percent.

Insecticides and herbicides used in row-crop agriculture can be washed into waterways, sometimes causing fish kills and always limiting the fishery. Accidental pollution may result from careless disposal of pesticide containers and washing of spray tanks near waterways.

Industrial pollution adversely affects sport-fish population, with pollutants ranging from runoff of oil from rail yards to the wasting of pesticides from formulating plants. Often the indirect effects of industrial pollution are as serious as the direct effects. Fish that are tainted in flavor because of pollution are unacceptable to sport and commercial users. Municipal pollution is serious in many local areas.

Poor land use allows high amounts of erosion, and turbid runoff is incompatible with good aquatic life conditions.

Man can enhance a natural stream fishery by reducing the heavy sediment being carried by the stream. However, aesthetics must be considered when enhancement is being contemplated.

Lake Fishing

The Lower Mississippi Region has 3,067,000 acres of lake habitat. Of this, 837,000 acres are between 2 and 40 acres in size and 2,230,000 acres are over 40 acres in size. Value of the lake habitat relative to sport fishing ranges from excellent to negligible. Some important factors determining lake productivity and value to sport and commercial fisherman are size, shoreline, depth, drainage area, and water quality.

The best lake habitat is the natural or man-made river oxbows still open to overflow or backwater flooding. All natural and most man-made lakes support warmwater type fishing only, but several of the large reservoirs in the northern portion of the region support two-story fisheries; i.e., a warmwater fishery at shallow depths and a cold-water trout fishery at greater depths. Water fluctuation between flooding and drawdown allows for high productivity of all fish, yet concentrates fish for the fishing season and favors the preferred game species such as largemouth bass. Sport freshwater fish that can tolerate low salinities make fishing in many of the coastal lakes excellent, especially for largemouth bass and catfish. Turbidity from land erosion is relatively high in many lakes throughout the region. While this generally does not limit fish or fishing success under most natural conditions, Arkabutla Lake located in northwestern Mississippi is an example of a lake fishery that is severely affected by sedimentation and turbidity. Lake fish most sought after include largemouth, white, and yellow bass; white and black crappie; bluegill; redear sunfish; and catfish. Less sought-after species include bullhead, carp, bowfin, and gar.

Physical modification of lake habitat may interrupt normal hydrologic patterns, such as seasonal water fluctuations, producing a long-lasting effect on productivity of the desired game fishes.

Pollution from suspended sediment (turbidity), either natural or man-caused, reduces the primary productivity by reducing light penetration needed for photosynthesis. Deposition of sediment smothers substrates, further reducing productivity of the microflora and fauna.

Chemical pollution may reduce lake productivity and sport fishing by direct kills or by limiting growth and reproduction. The most common source of insecticide and herbicide pollution in lakes is runoff from croplands. Industrial and municipal sources also contribute to lake pollution.

Aquatic weeds such as water hyacinth are a chronic problem in many shallow lakes throughout the region. Improper management limits lake productivity for game-fish species. The introduction of undesirable species of fish in many lakes is a common problem. Management of natural lakes is generally not practical. Biological management, such as fish introductions, have enhanced fishing in some natural lakes. Management of artificial lakes is quite frequently needed to bring about optimum fishing.

Pond Fishing

For this study, ponds include all permanent bodies of standing water under two acres in size, as well as larger bodies which provide similar fishing. Often, ponds are referred to as being farm structures made by man commonly to water livestock; however, small borrow pits and the natural low areas which hold water permanently may be considered ponds.

Flounder - a prized saltwater catch.

The region has approximately 524,000 acres of pond habitat. Generally, ponds are moderately deep compared to the surface size. Man-made ponds are commonly constructed with steep banks to help avoid weed problems. Water supply to ponds is generally from a small watershed, and the quality of the water is related to watershed land use. Pond productivity is directly related to the productivity of the soil of the pond bottom as well as fertility of the watershed. Because of the physical relief of the land, most ponds in the delta or alluvial valley are the result of soil removal for roadbed or levee construction. Ponds in the hill portions of the region are the result of natural water traps or dams constructed by man. Pond fish most sought after include largemouth bass, bluegill, redear sunfish, and channel catfish.

Some of the more significant factors affecting pond habitat are water quality, sediment, and management.

Ponds on both bottomland and upland sites are susceptible to excessive sedimentation and turbidity, primarily man-caused. Bottomland ponds are susceptible to serious chemical pollution. In many areas of the alluvial valley, pond fishing is essentially absent because of yearly fish kills by pesticides.

Improper management of pond-type habitat including improper

stocking, inadequate fertilization, and over or under harvest can limit fish production. Because of size and cost advantages, ponds are capable of providing intense fishing but normally do not reach their potential due to underutilization.

Saltwater Fishing

Inshore saltwater finfish habitat includes salt and brackish bays, bayous, canals, and lakes. There are approximately 3,281,000 acres of inshore saltwater habitat in the region located totally in Louisiana. Generally, salt or brackish water habitat extends inland to the Intracoastal Waterway. Because of the importance of sport and commercial fish dependent on the estuarine areas, considerable study has been done. The productivity of the estuarine complex is very high and results from the influx of nutrients from upland areas, the tidal flushing which keeps nutrients available in the water, the natural chemical and physical properties of the water, and the accessibility of food from the salt to brackish marshes. Today, the intensity of interest in preserving coastal estuarine areas speaks well for their overall value, including fishing. The most sought after inshore saltwater fauna are shrimp, crab, speckled trout, redfish, croaker, flounder, drum, sheepshead, and sand seatrout.

Factors affecting the resource that are induced by man include alteration of natural water flow patterns and salinity regimes and pollution. Most activity in the coastal area requires waterborne transportation. Artificial waterways can alter salinity regimes, drain wetland areas, increase turbidity because of increased traffic and consequent shoreline erosion, and destroy water bodies.

Channelization of coastal streams may reduce the capacity of waterways to support sport fish. Improperly constructed weirs may retard or eliminate needed migration of sport fish or the food of sport fish. Certain types of canal systems may result in stagnant lagoons with no fishery resource value. Deposition of spoil may add to turbidity and sedimentation which smother water bottoms and reduce light penetration.

All types of pollution including agricultural, industrial, and municipal are affecting saltwater fish as well as other life in coastal Louisiana. Industrial pollution consists not only of chemical pollutants from refineries and factories, but organic pollutants that may kill fish, retard productivity, or render the flesh unfit for consumption because of poor taste or odor. Organic pollution, if severe, can reduce sport fishing harvests.

Natural climatic conditions can also affect saltwater fish habitat. Hurricanes, excessive rainfall, or too little rainfall can all affect saltwater fish resource productivity.

Commercial Fishing

Wild freshwater fish habitat consists of all water areas; however, harvest primarily occurs from the large natural and man-made lakes and the major stream systems. The contribution of all water areas to commercial fishery production is significant, even though the smaller areas do not provide the harvest site. Six species represent 97 percent of the region's commercial harvest of wild freshwater fish including buffalo, bullhead and other catfish, crayfish, freshwater drum, carp, and gar.

Estuarine and marine fishery habitat consists of marshland and estuarine and marine water areas located in WRPA's 9 and 10. Estuarine habitat totals 7,289,588 acres which represents approximately 50 percent of all such habitat in the United States. This consists of 3,910,664 acres of marsh and 3,281,000 acres of estuarine water areas. The remaining 97,924 acres consist of marine water areas. Major freshwater sources are the Atchafalaya, Calcasieu, Sabine, and Mississippi Rivers. The average value per acre of marsh as it contributes to the commercial fishery is about $20 annually. Average values range from $10 per acre for shrimp to just a fraction of a cent for other species. Most habitat for cultured catfish is man-made ponds. High-quality surface and ground water sources provide the necessary water. Crayfish habitat consists of natural and man-made water areas. Most productive crayfish habitat is flooded only in the spring for harvest, and is dry in summer and fall to cut down on predation. The most valuable commercial estuarine and marine fauna include shrimp, menhaden, oysters, unclassified industrial fish, and blue crabs, which account for about 98 percent of the total harvest value. Estuarine and marine fish of lesser value ranked in order of importance are: spotted seatrout, croaker, red drum, flounder, Gulf kingfish, black drum, sand seatrout, sheepshead, pompano, spanish mackerel, mullet, and spot.

Factors affecting the commercial fisheries resource are both from natural and man-induced causes. Loss of fish or fish habitat usually occurs when the habitat is altered for navigation, drainage, and flood control purposes. Physical alteration of the estuarine environment has significantly modified the entry of nutrients into the system. Levees have denied the historic natural introduction of nutrients into many marsh areas. Man-induced saltwater intrusion is a detriment to commercial fish productivity. Water pollution from industrial sources introduces toxic pollutants into the fishery resource, causing fish kills. Nontoxic pollutants frequently impart an unfavorable odor or taste to fish which significantly limits potential use.

Natural causes affecting commercial fisheries are significant, primarily in the estuarine area. Inland commercial fisheries are ecologically adapted to a wide range of environmental conditions, especially backwater flooding. Estuarine commercial fisheries are somewhat controlled by natural causes that affect tides, salinities, temperatures,

Unaltered stream habitat.

Channelized stream habitat.

oxygen levels, and other parameters which influence estuarine fish production.

Land Resources

Big Game

Big game habitat consists primarily of the 29,637,000 acres of forest land in the region. Some forest land is in plots too small for significant big game utilization. Portions of cropland, pastureland, and wetland acreages afford some use but do not represent a significant contribution to big game populations if in close association with forest land.

There are 10,850,000 acres of bottomland hardwood forests within the region. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forest, total 7,181,000 acres. These forests constitute high quality deer and turkey range. There are 3,907,000 acres of pine hardwood habitat and 7,699,000 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests to poor in the pine forests. The present capacity of forest-land resources for big game ranges from insignificant to high in value. Some areas will not support deer and turkey hunting while some of the bottomland hardwoods support as much as one deer per 5 acres, and one turkey per 25 acres.

Big game animals of the region supporting hunting are white-tailed deer and eastern wild turkey. Black bear, found in several portions of the region, are low in numbers with no open seasons. Feral hogs are not considered a game animal.

Land use is the most vital factor affecting big game. Because the big game animals found in the region are all forest-land dependent species, big game hunting is directly correlated in quantity with the amount, character, and arrangement of forests. Clearing of forest lands reduces available habitat. While deer do well on relatively small plots of forests, turkeys require tracts of 20,000 to 25,000 acres to support hunting.

Illegal year-round hunting and harassment by dogs are serious factors, but with the recent improvements in law enforcement these factors are insignificant when compared with loss of habitat. Competition for range with cattle and hogs is very substantial in some areas, but generally not considered serious. Natural predation and disease are not significant where management has kept herds in reasonable balance with their range.

Either sex deer hunts are more accepted in the region than elsewhere in the Nation. This management tool allows maximum utilization of the resource. Because turkeys are still making a comeback, gobbler hunts only are the general rule and this allows for the most rapid repopulation possible.

Though deer were generally present in the entire coastal marsh exclusive of highly saline areas, spoil banks built during canal construction projects have allowed populations to increase in many areas.

Small Game

Small game habitat consists of the 29,637,000 acres of forest land and the usable portions of the 20,214,000 acres of croplands, 6,782,000 acres of permanent pasturelands, and 4,353,000 acres of wetlands.

Principal small game animals of the Lower Mississippi Region are squirrels (gray and fox), rabbits (cottontail and swamp), bobwhite quail, mourning dove, raccoon, and woodcock. Less important species include snipe, rail, fox (gray and red), and opossum.

The value of the habitat to the different small game species varies considerably. The most productive squirrel habitat is the older mast-producing woodlands with a large number of den trees; that is, trees with rotting centers or holes where squirrels may nest. Farm land is of no value to rabbits and quail unless there is cover and food available. Soybean fields when harvested will feed migratory doves; but cotton-fields provide very little food unless weeds are abundant. Raccoons inhabit woodlands interspersed with open land so as to have den trees to nest as well as to spend their inactive hours. Woodcock feed in moist fields with adjacent cover to spend the daylight hours quietly. Much of the coastal wetlands provide habitat for rail and snipe.

Factors affecting the small game resource are as varied as the different types of small game and the variety of habitat.

Factors affecting squirrel habitat are clearing of land for conversion to cropland or pasture, timber practices which eliminate den trees, or total conversion from a hardwood forest to a cottonwood, sycamore, or other nonmast-producing forests.

Generally, any habitat with available food and cover will support rabbits. The major factors affecting this small game resource are overgrazing, clean farming, and pesticides.

Mourning dove and bobwhite quail are considered farm game and are abundant. As with rabbit populations, clean farming, overgrazing, and pesticides are the major factors affecting this small game resource. Since the region is agriculture-oriented and mechanical equipment is employed, waste from harvest provides ample food for farm game species.

Woodcock primarily eat earthworms which are subject to pollution by insecticides.

Waterfowl

Waterfowl species of importance to the region are primarily mallard, wood duck, teal, pintail, and widgeon, plus Canada, blue, snow, and white-fronted geese. Waterfowl species of lesser importance are shovelers, scaup, gadwall, ring-necked, mottled ducks, and gallinule.

The region's waterfowl habitat consists of major water areas, seasonally flooded timber, marshes, flooded grainfields, as well as other agricultural land. There are approximately 4,361,000 acres of fresh and brackish marshes and seasonally flooded hardwoods which are not considered water areas. Resident wood ducks rely heavily on hardwoods adjacent to the water for nesting cavities. The primary use of the habitat, however, is for the feeding and nesting of migratory, wintering waterfowl. The Migratory Bird Treaty Act of 1918 provides for the protection of migratory birds in the United States and Canada. Maintenance of water quality and quantity in the wintering areas for such species is necessary to meet United States responsibility under provisions of that treaty.

The Mississippi Flyway is one of the most important flyways in the United States for migratory birds, and the coastal and estuarine area of Louisiana provides one of the most important wintering areas in that flyway for waterfowl and other migratory bird species. Every effort must be made to protect the wintering areas of these internationally valuable species from degradation.

Population levels are primarily determined by breeding success primarily outside the basin. Therefore, only factors affecting hunter success in the region will be discussed.

Air temperature and availability of water are the two major factors affecting the region's waterfowl hunter success. Too mild temperatures will not force waterfowl into the region, just as too cold weather may move waterfowl significantly out of some of the northern portions of the region. Individual State game and fish agencies attempt to set the prescribed season in order to allow maximum hunter success throughout the season.

In the interior delta, excessive water reduces the attractiveness of artificial greentree areas and generally limits hunter success. At the same time, insufficient water renders wooded wetlands useless for waterfowl. Proper amounts of flooding make harvested grainfields very attractive to dabbling ducks. In recent years the planting of soybeans on progressively wetter sites has provided significant waterfowl resting and feeding areas. Too much water in the marsh will make water too deep for ducks to feed and scatters the birds too widely to hunt

Big game hunting in the region.

The region is a significant component of the Mississippi Flyway.

effectively. Where ducks may feed on grass seeds, a reduction in water levels is required in the summer and fall months to allow growth to maturity.

Other factors affecting the waterfowl resource are lead poisoning and short-stopping. Short-stopping waterfowl (waterfowl wintering farther north than in previous years) simply alter normally expected migration patterns. This creates some crowded conditions which many biologists feel subject waterfowl to unnecessary danger of disease.

Fur Animals

The Lower Mississippi Region has one of the most productive commercial fur-taking areas in the Nation. Fur animals of commercial importance to the region are muskrat, nutria, raccoon, mink, otter, and opossum, and to a lesser degree, beaver, skunk, bobcat, and fox.

The coastal marsh area supports nearly all of the region's nutria and muskrat. There are an estimated 4,353,000 acres of wetland habitat, much of which is coastal marsh. The 29,637,000 acres of forest land and portions of the cropland and pastureland acreage supply habitat primarily to raccoon, opossum, bobcat, fox, and skunk. Mink and otter utilize the wooded wetland areas.

The Louisiana fur industry leads the Nation with 40 percent of the U. S. production of wild furs, with a value of $5,000,000 to $10,000,000 annually. The coastal and estuarine habitat produces most of the region's nutria and muskrat and most of the mink and otter trapped in Louisiana.

Since the significant commercial trapping is generally far removed from any sport aspects, economics enters as a primary factor affecting the harvest. For the many trappers who trap primarily for fun and also for a few extra dollars, the price of pelts has little to do with their effort. Many trappers would probably continue to trap even in the absence of an adequate market for their pelts. For the trapper who has to make a significant portion of his annual income from trapping, however, the job is more labor than sport. It is with these efforts that factors affecting the resource will be discussed.

Productive fur habitat is the major basic requirement. Quantity as well as quality of the habitat is important. Upland areas of the region as well as the interior bottomlands are rapidly losing a major portion of their most important fur habitat, the wooded wetlands, and stream bottomland areas. In these areas the lack of quantity as well as the quality of the habitat limits the potential. Habitat can be affected by too much or too little water, loss of vegetation, loss of food supply, a shift in type of vegetation, and many other factors.

Marsh grasses which are the source of food for muskrats and nutria

are dependent upon specific water levels and salinities for maximum growth. Too much or too little rainfall as well as hurricanes may alter conditions as to be unfavorable to maximum production. Man-made ditches can drain marshes as well as allow saltwater intrusion.

Factors which more directly determine the trapper's success are seasonal temperatures, alligators, and market demand for the pelts. Weather conditions affect the quality and price offered for the pelt. Too cold weather in the coastal marshes can kill nutria, which is a rodent native to South America, by freezing the tails and feet. Alligators in great abundance can steal muskrats and nutria from traps before the trapper has a chance to remove them.

Other Wildlife

Other fish and wildlife of sport and nonsport value include rare and endangered fish and wildlife such as the red wolf, cougar, eagles; animals of concern to nonconsumptive users such as songbirds, shore birds, reptiles, amphibians, insects, etc.; and those animals which are consumptively used such as bobcats by varmint hunters, frogs, crayfish, etc.

Essentially all 65,538,000 acres in the region provide habitat for one or more kinds of other wildlife. Even urban and built-up areas support some songbirds, insects, reptiles, and mammals. The habitats of significance to rare and endangered fish and wildlife are those areas of major concern to nonconsumptive or wildlife-oriented recreationists. Frequently, the areas are as specific as a Gulf coast cheniere, an upland swamp, upland stream, or a bottomland tract of virgin timber.

Much of the specific data that are available for game animals and fish are unavailable for most kinds of other wildlife. For such animals as eagles and alligators, which are of high interest and importance to many people, major studies have been made. Most nongame fish and wildlife, including the associated flora, are not the primary concern of many sport fishermen or hunters, but are important members of the total ecosystem. In fact, the success of the entire ecosystem is dependent upon an essentially complete plant and animal community.

Because there are other types of fish and wildlife on virtually every type of available habitat, any change of habitat will have a consequent change in some type of fish or wildlife. Very subtle factors such as close human activity can affect eagle nesting. Close human activity is also intolerable to black bear, cougar, and red wolf. New and improved techniques and equipment make possible the use of animals and areas which were once inaccessible.

Educational use of natural areas.

All kinds of fish and wildlife are important.

PRESENT AND FUTURE NEEDS

The purpose of this section is to quantify the future need for fishing and hunting by establishing projections expressed as needs. Sport fishing and hunting needs as well as nonconsumptive wildlife-oriented recreation needs can be defined as the number of angler-days, hunter-days, or user-days that will be required for the use of the region's human population. Needs for commercial fish and fur are expressed in pounds of fish or number of pelts needed to supply the market of the future. These needs are then translated into water and land resource needs.

Water Resources

Region residents needed an estimated 29,992,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $199 million. Sport fishing needs are expected to increase to 50,948,000 and 58,183,000 angler-days by 2020 under Program A and B objectives, respectively (table 1). Table 2 shows the angler-day needs in terms of habitat requirements (figures 2 and 3).

Land Resources

Region residents needed an estimated 12,465,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $81 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 21,075,000 and 24,091,000 hunter-days by 2020 under Program A and B objectives, respectively (table 3). Table 4 shows the hunter-day needs in terms of habitat requirements (figures 4, 5, 6, and 7).

Commercial Fisheries

Fish harvested from the waters of the Lower Mississippi Region comprise three categories: (1) marine and estuarine fish, (2) catfish and crayfish, and (3) wild freshwater fish.

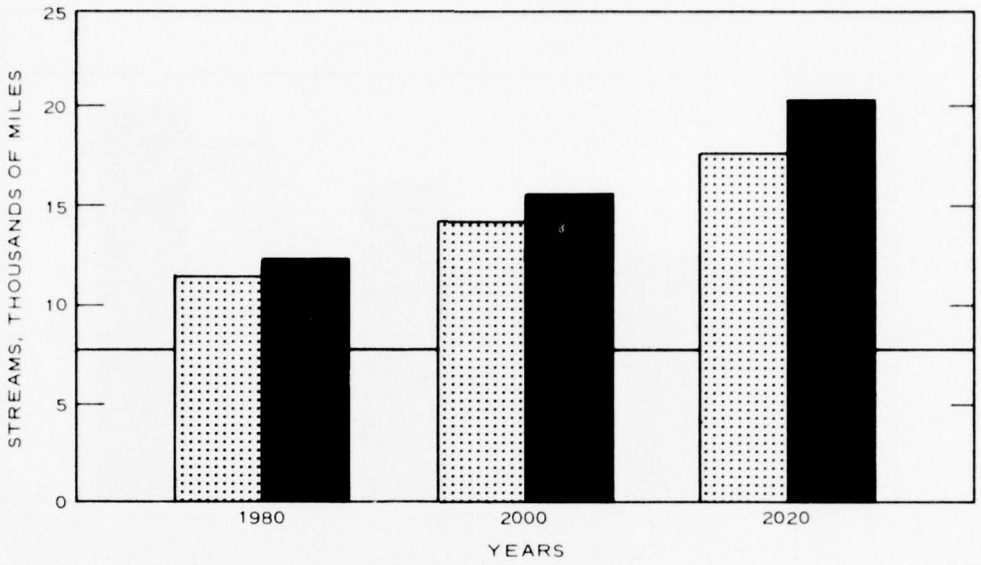
Marine and estuarine fish are taken when of harvestable age. Included are euryhaline species that can survive either in salt water or fresh water and that characteristically enter inland freshwater areas for spawning purposes. Fish and shellfish in the catfish and crayfish category include only those raised in the agriculture industry. Wild fish consist of those caught for commercial purposes in freshwater streams and lakes.

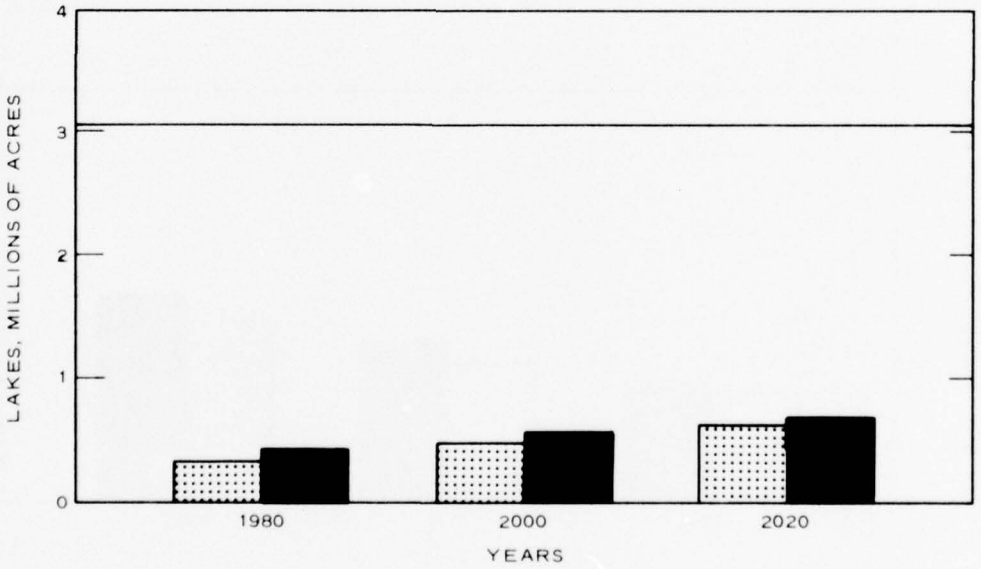
Table 1 - Sport Fishing Gross Needs,
Lower Mississippi Region

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	7,719	8,375	10,279	13,016
	B		9,056	11,576	14,883
Lake Fishing	A	11,952	12,976	15,913	20,157
	B		14,027	17,928	23,044
Pond Fishing	A	5,299	5,677	6,962	8,820
	B		6,137	7,844	10,081
Saltwater Fishing	A	5,022	5,608	7,007	8,955
	B				
Totals	A	29,992	32,636	40,161	50,948
	B		35,269	45,185	58,183

Table 2 - Sport Fishing Habitat Gross Needs,
Lower Mississippi Region

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	7,699	A	10,528	11,423	14,020	17,746
		B		12,350	15,787	20,300
Lake (1,000 Acres)	3,067	A	361	393	482	612
		B		424	543	698
Pond (1,000 Acres)	524	A	262	284	349	439
		B		307	390	494
Estuary (1,000 Acres)	3,281	A	836	939	1,167	1,491
		B		1,006	1,305	1,687
Total Acres	6,872	A	1,459	1,616	1,998	2,542
		B		1,737	2,238	2,879





LEGEND

PRESENT RESOURCE AVAILABILITY

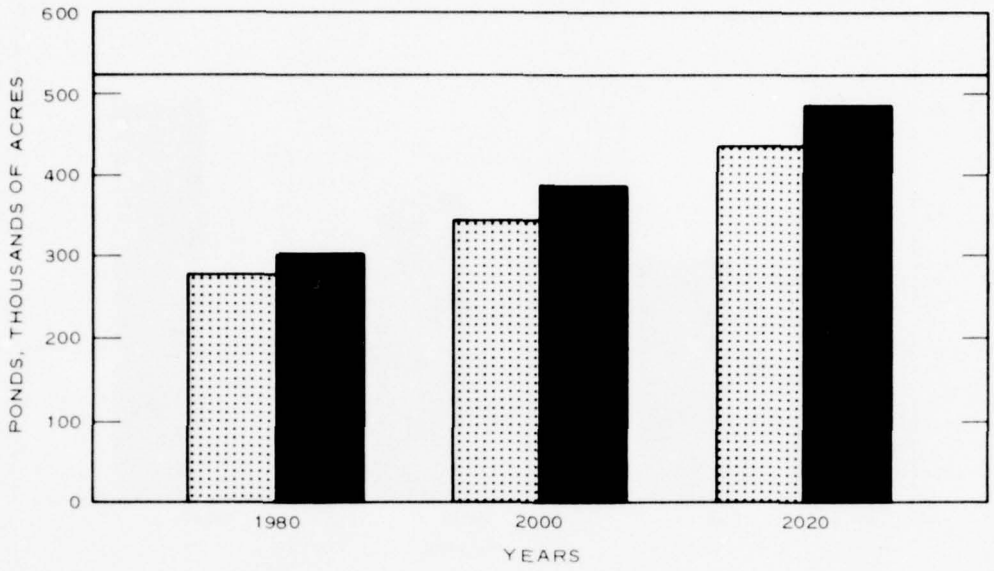
NATIONAL INCOME OBJECTIVE RESOURCE NEEDS

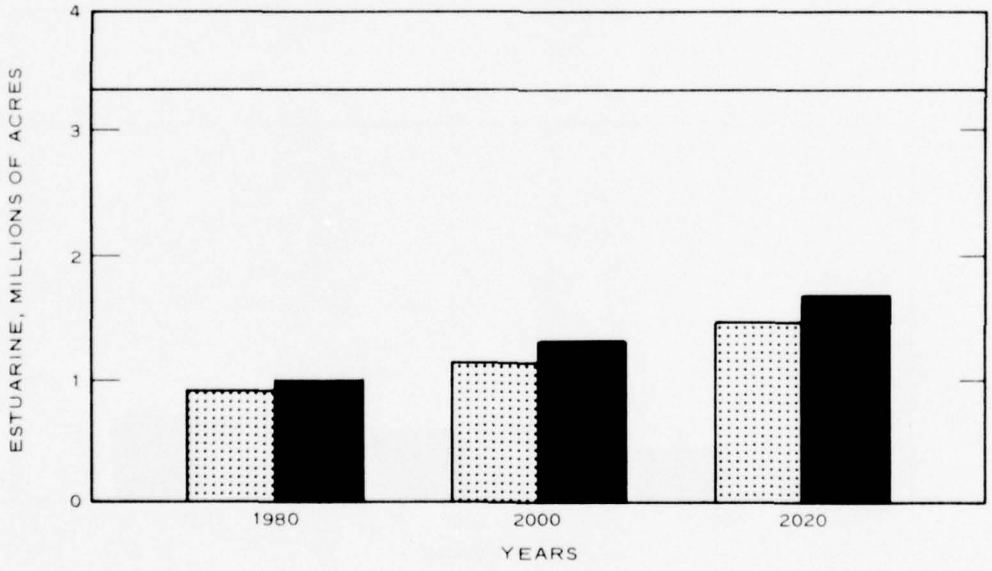
REGIONAL DEVELOPMENT OBJECTIVE RESOURCE NEEDS

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

EXISTING SPORT FISHING RESOURCE AND PROJECTED NEEDS

FIGURE 2





LEGEND

PRESENT RESOURCE AVAILABILITY

NATIONAL INCOME OBJECTIVE RESOURCE NEEDS

REGIONAL DEVELOPMENT OBJECTIVE RESOURCE NEEDS

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

EXISTING SPORT FISHING RESOURCE AND PROJECTED NEEDS

FIGURE 3

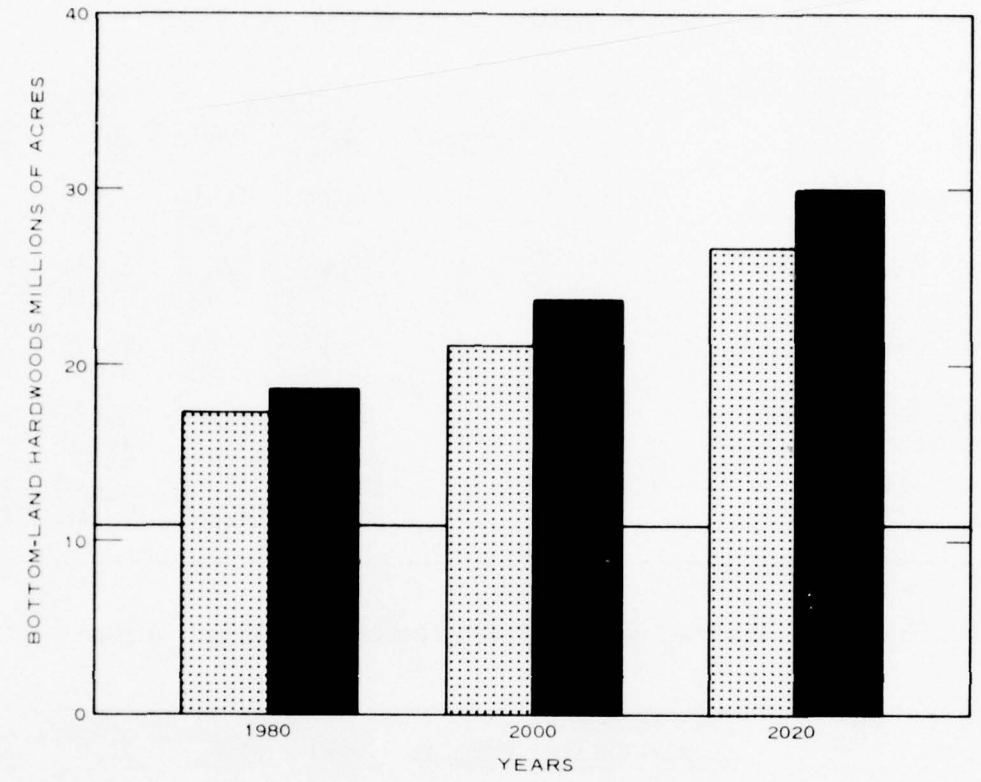
Table 3 - Hunting Needs, Lower Mississippi Region

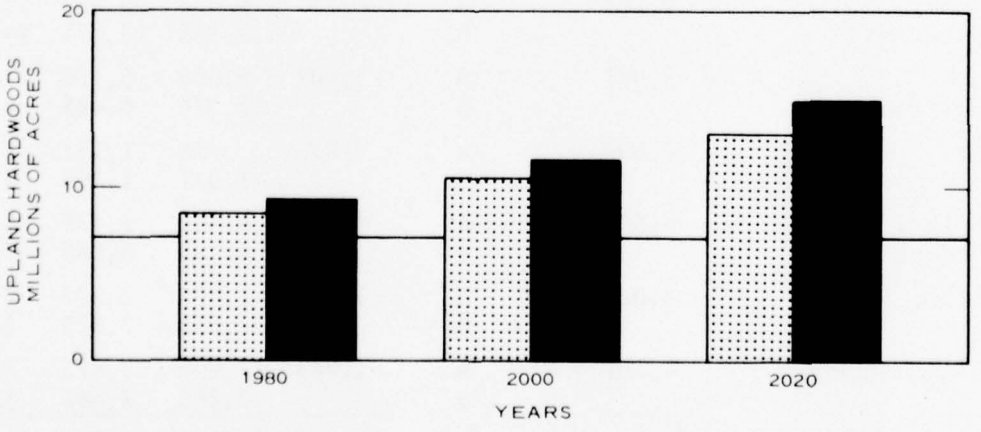
Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	1,976	2,145	2,630	3,332
	B		2,320	2,963	3,808
Small Game	A	6,446	7,032	8,624	10,924
	B		7,600	9,715	12,487
Waterfowl	A	827	898	1,102	1,394
	B		969	1,237	1,595
Wildlife-Oriented Recreation	A	3,216	3,492	4,282	5,425
	B		3,774	4,830	6,201
Totals	A	12,465	13,567	16,638	21,075
	B		14,663	18,745	24,091

Table 4 - Hunting Habitat Needs, Lower Mississippi Region

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood 1/	10,850	A	10,850	17,217	21,104	26,738
		B		18,611	23,776	30,522
Upland Hardwood	7,181	A	7,181	8,454	10,360	13,126
		B		9,135	11,671	14,985
Pine Hardwood	3,907	A	3,907	4,696	5,756	7,292
		B		5,076	6,485	8,326
Pine	7,699	A	855	938	1,151	1,459
		B		1,017	1,296	1,664
Cropland "edges" 2/	6,564	A	4,055	4,430	5,438	6,881
		B		4,788	6,083	7,802
Pasture 3/	3,021	A	1,738	1,898	2,327	2,949
		B		2,052	2,623	3,342
Wetland	4,361	A	1,943	2,096	2,573	3,256
		B		2,263	2,889	3,728
Totals	43,580	A	30,520	39,729	48,704	61,701
		B		42,942	54,823	70,369

1/ Includes WRPA 1.
2/ Includes suitable acres only.
3/ Includes suitable acres only.





LEGEND

PRESENT RESOURCE AVAILABILITY

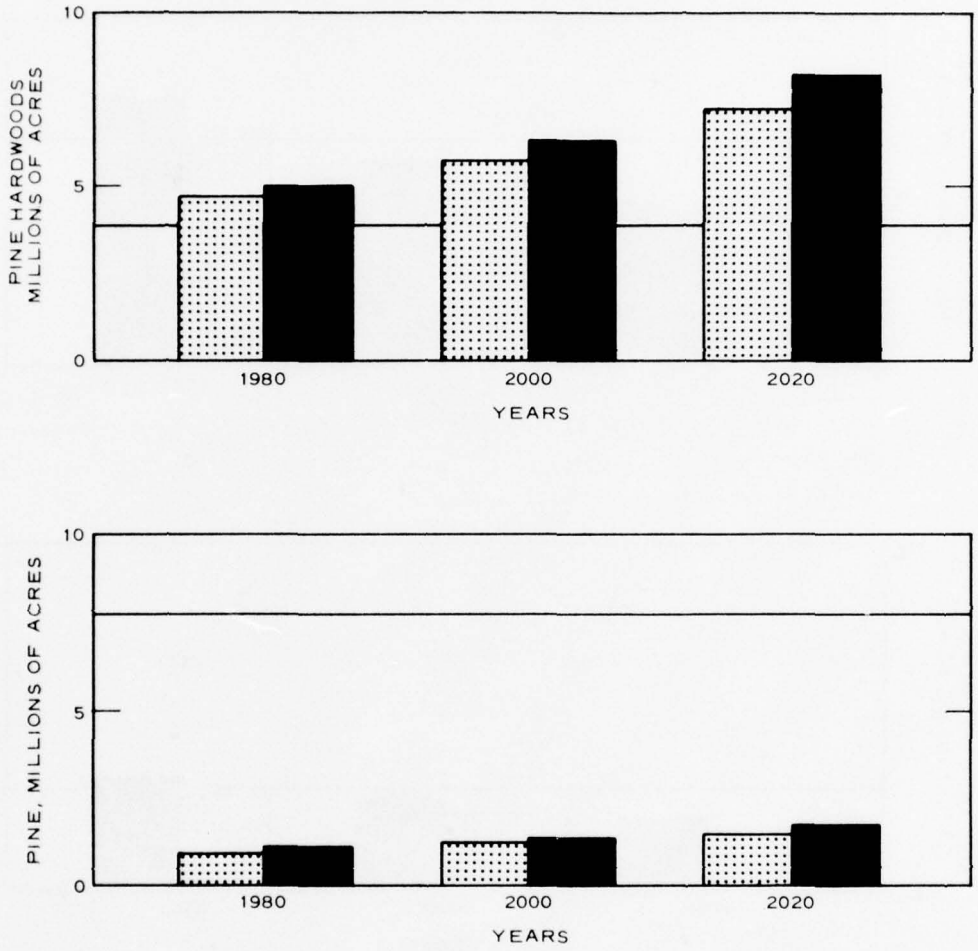
NATIONAL INCOME OBJECTIVE RESOURCE NEEDS

REGIONAL DEVELOPMENT OBJECTIVE RESOURCE NEEDS

LOWER MISSISSIPPI REGION COMPREHENSIVE STUDY

EXISTING HUNTING RESOURCE AND PROJECTED NEEDS

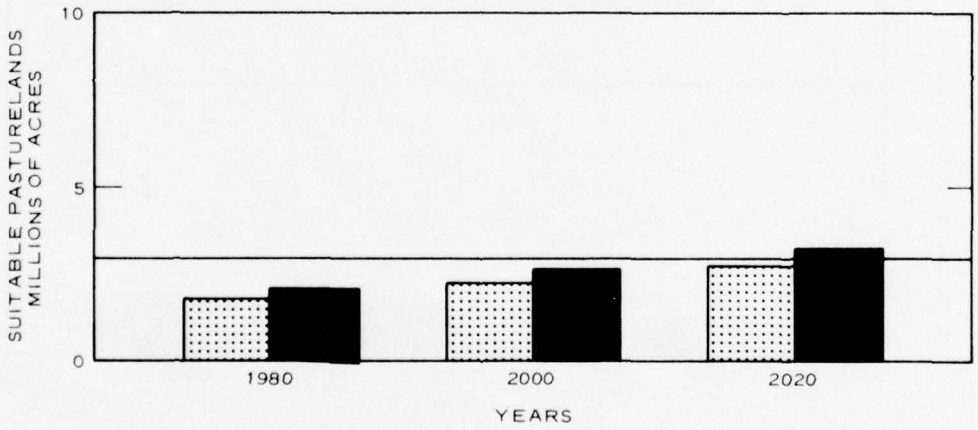
FIGURE 4



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

EXISTING HUNTING RESOURCE AND PROJECTED NEEDS

FIGURE 5



LEGEND

PRESENT RESOURCE AVAILABILITY

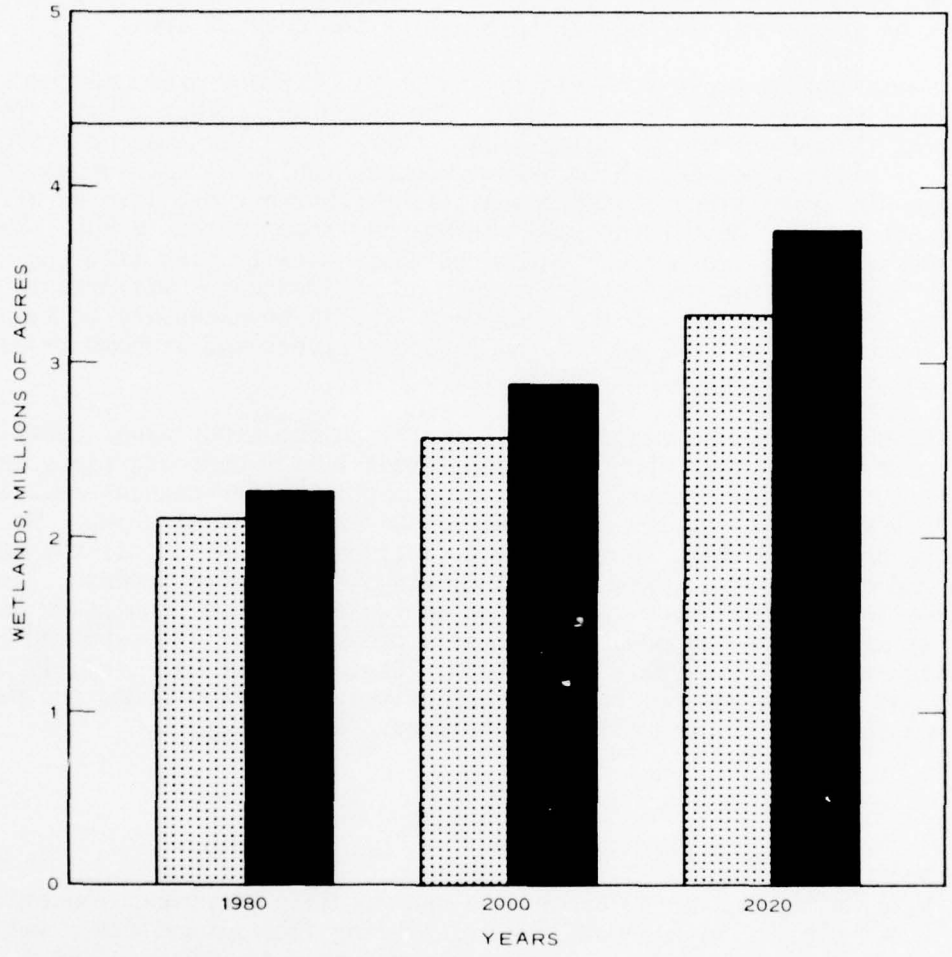
NATIONAL INCOME OBJECTIVE RESOURCE NEEDS

REGIONAL DEVELOPMENT OBJECTIVE RESOURCE NEEDS

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

EXISTING HUNTING RESOURCE AND PROJECTED NEEDS

FIGURE 6



LEGEND

PRESENT RESOURCE AVAILABILITY

NATIONAL INCOME OBJECTIVE RESOURCE NEEDS

REGIONAL DEVELOPMENT OBJECTIVE RESOURCE NEEDS

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

EXISTING HUNTING RESOURCE AND PROJECTED NEEDS

FIGURE 7

The 1970 harvest of marine and estuarine fish was 1.2 billion pounds. The fishery is located entirely within the region's coastal area, primarily in WRPA's 9 and 10. The current production of the estuarine fishery is considered to be near maximum capability of the estuarine zone, considering multiple use of the coastal area.

Commercial harvest from the region's wild fishery produced about 25.3 million pounds of fish in 1970. The catch was rather evenly distributed throughout all planning areas. WRPA 9 was the leading producer with 5.5 million pounds, while WRPA 7 produced only 0.6 million pounds. A large declining trend in the annual fishery harvest has leveled off in recent years. Most rivers and streams and some of the larger lakes contribute to this resource. Future harvests of wild fish from the region have not been predicted inasmuch as no freshwater withdrawals are required for this fishery. However, it will be necessary to maintain the quality and regimen of the region's rivers and streams to allow the continued harvesting of edible fish.

Fish farming is a significant industry in the study area. Catfish farms are located throughout, with the greater 1970 concentrations in WRPA's 2, 9, and 4. Crayfish are raised mostly in the coastal area in WRPA's 9 and 10, generally as an off-season or rotational adjunct to rice production. There is foreseen a continued demand for all the catfish and crayfish the region's fish farming industry can produce. Increases in regional needs reflect the increase in human population as well as an increase in pounds per capita consumption. The expected consumption rate for the years 1970, 1980, 2000, and 2020 are 11.2, 12.0, 15.0, and 20.0 pounds per capita, respectively. Table 5 shows the present and future fish production requirements for the region.

Water Supply

Fish and Wildlife

Water withdrawn in 1970 for fish and wildlife purposes amounted to over 3,300 m.g.d., with about 20 percent being from ground water and 80 percent from surface water. Consumption amounted to nearly 2,900 m.g.d. Withdrawals were used to maintain water levels in management areas for mast-producing green tree reservoirs and duck resting areas, and to replenish lakes for sport fishing. Fish and wildlife is the second largest consumer of water in the region. Withdrawals were greatest in WRPA 10, which accounted for 56 percent of the 1970 regional withdrawals. Other major withdrawals were made in planning areas 9, 2, and 5, with minor withdrawals in each of the remaining WRPA's.

Future water withdrawal needs for fish and wildlife are related to an increasing population of sportsmen dependent in part upon existing and future management areas. Because this population can vary in size without affecting the form or operation of management areas, future water

Table 5 - Present and Future Fish Production Requirements,
Lower Mississippi Region

WRPA	Existing Production, 1,000 lbs. Marine & Estuarine	Wild	Catfish & Crayfish	Program	Future Fish Production, 1,000 lbs.[1/] 1980 Catfish & Crayfish	1980 Total	2000 Catfish & Crayfish	2000 Total	2020 Catfish & Crayfish	2020 Total
2	0	6,037	10,435	A & B	13,513	19,550	19,669	25,706	25,826	31,863
3	0	1,398	391	A & B	691	2,089	1,291	2,689	1,891	3,289
4	0	2,301	7,369	A & B	12,913	15,214	24,000	26,301	35,087	37,388
5	0	3,487	2,748	A & B	4,878	8,365	8,739	12,226	13,000	16,487
6	0	1,059	1,213	A & B	3,070	4,129	6,583	7,642	10,196	11,255
7	0	612	587	A & B	978	1,590	1,761	2,373	2,543	3,155
8	0	1,102	896	A & B	1,356	2,458	1,878	2,980	2,200	3,302
9	869,673	5,492	11,978	A & B	17,161	892,326	22,726	897,891	29,891	905,056
10	353,846	3,741	2,383	A & B	2,883	360,470	3,683	361,270	4,483	362,070
LMR	1,223,519	25,229	38,000	A & B	57,443	1,306,191	90,330	1,339,078	125,117	1,373,865

1/ Marine and Estuarine production constant at 1,223,519 lbs./yr.
Wild fisheries production constant at 25,229 lbs./yr.

withdrawal needs are considered to be identical for both A and B Programs. Needs for fish and wildlife water withdrawals are expected to increase from a current use of about 3,300 m.g.d. to about 4,500 m.g.d. by the year 2020, a 36 percent increase. Consumption based on present experience is estimated to be about 80 percent of withdrawals. Table 6 provides withdrawal and consumptive use data for future fish and wildlife water needs in the Lower Mississippi Region.

Commercial Fisheries

In 1970 the fish farming industry's water withdrawals amounted to nearly 288 m.g.d., about 57 percent from ground water and the remainder from lakes and streams. Consumption was roughly 95 percent of withdrawals. No water withdrawals were made in 1970 to aid the region's wild or marine and estuarine fishery.

Present and future water withdrawal needs to enhance and sustain the 1970 estuarine production levels beyond 1980 and to reflect feasible production increases in fish farming are shown in table 7.

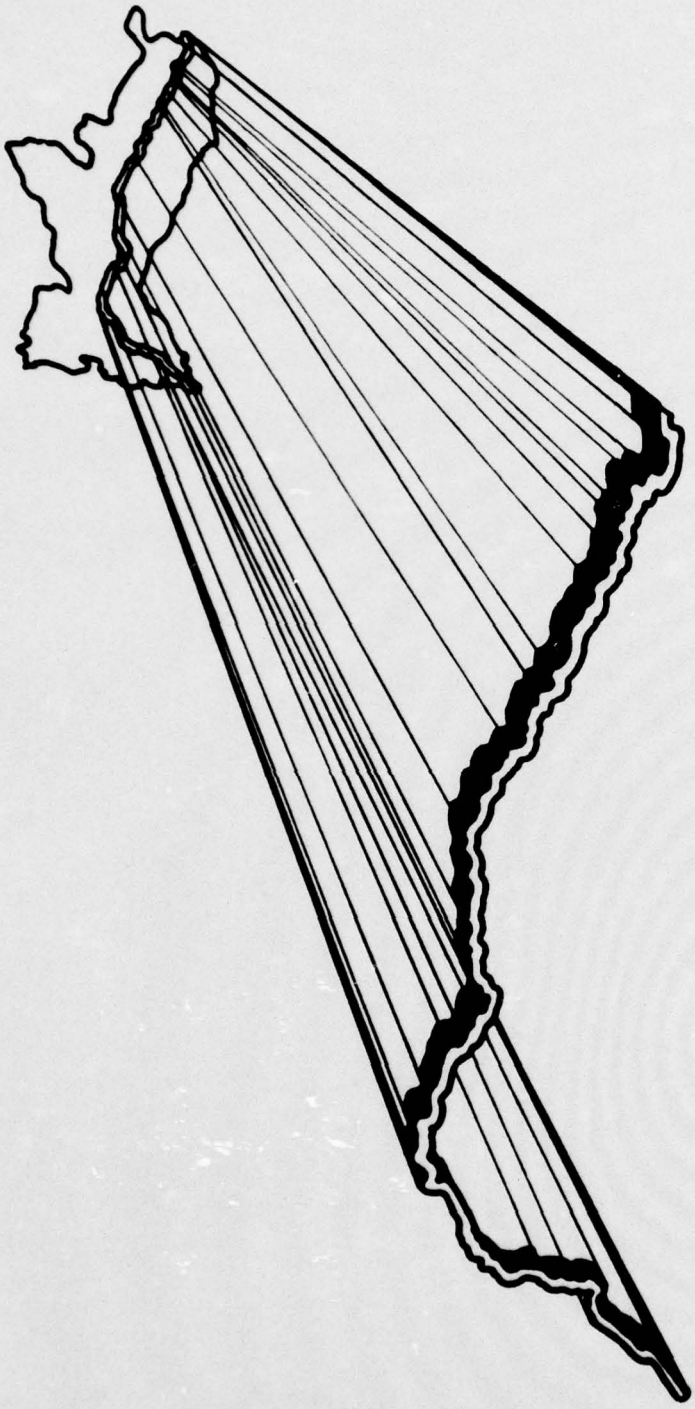
Table 6 - Present Use and Future Fish and Wildlife Water Withdrawal Needs, Lower Mississippi Region (m.g.d.)

	1970			1980		2000		2020	
WRPA	Withdrawal	Consumption	Program	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
2	580	371	A & B	630	405	740	482	850	560
3	33	32	A & B	76	70	162	77	248	77
4	31	23	A & B	53	40	83	59	117	82
5	254	174	A & B	285	196	345	236	407	280
6	67	46	A & B	75	51	91	63	108	76
7	5	4	A & B	7	5	13	10	18	14
8	3	3	A & B	5	4	8	6	12	9
9	484	399	A & B	557	443	745	573	865	636
10	1,845	1,844	A & B	1,845	1,844	1,847	1,846	1,848	1,847
LMR	3,302	2,896	A & B	3,533	3,058	4,034	3,352	4,473	3,581

Table 7 - Present Use and Future Water Withdrawal Needs for Commercial Fish Production [1/]
Lower Mississippi Region

WRPA	1970 Use		Program	Water Needs, m.g.d.					
				1980		2000		2020	
	Withdrawal	Consumption		Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
2	99.9	94.9	A & B	130.0	117.0	188.0	169.0	247.0	222.3
3	3.7	3.5	A & B	6.6	6.0	12.4	11.1	18.1	16.2
4	70.6	67.1	A & B	123.6	111.2	229.8	206.8	336.0	302.4
5	22.4	21.3	A & B	40.8	36.7	77.8	70.0	118.6	106.7
6	8.7	8.3	A & B	24.6	22.1	56.3	50.7	88.1	79.3
7	5.6	5.3	A & B	9.4	8.5	16.9	15.2	24.4	22.0
8	1.9	1.8	A & B	4.4	4.0	9.4	8.5	14.4	13.0
9	66.8	63.5	A & B	85.8	77.2	123.8	111.4	161.7	145.5
10	7.5	7.1	A & B	10.4	9.4	16.1	14.5	21.9	19.7
LMR	287.1	272.8	A & B	435.6	392.1	730.5	657.4	1,030.2	927.1

1/ Need for water supply to Marine and Estuarine fisheries 36,900 m.g.d. held constant over time WRPA 10 = 28,000 and WRPA 9 = 8,900 (not included in above tabulation).



WRPA 1

W R P A 1

DESCRIPTION

WRPA 1 encompasses the area within the main stem of the lower Mississippi River below the mouth of the Ohio River, extending to and including the main line Mississippi River levees, or to the river's top bank where levees do not exist. It contains approximately 1,559,000 acres, or 2,436 square miles of land and water area. The present length of the lower Mississippi River is 954 miles, and the average width is 0.9 of a mile (figure 8).

The WRPA has a very level terrain that has numerous natural and man-made small and large water areas. Oxbow lakes and bayous continually break the continuity of the land surface. All of the area drains directly into the Mississippi River.

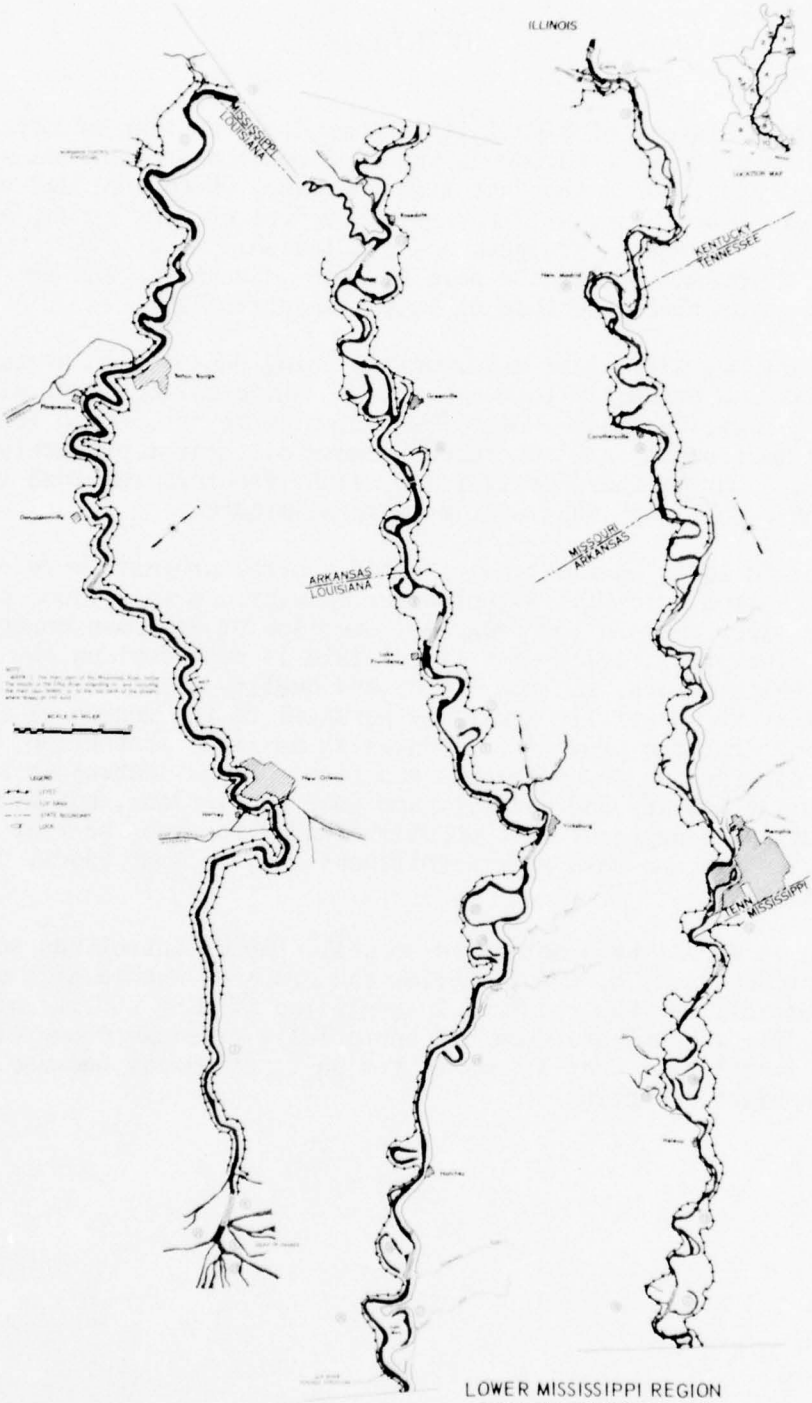
There is only one small community within WRPA 1; therefore, the population is considered transient and counted in adjacent WRPA populations.

Deer - the primary big game species.

MAP INDEX

WRPA 1

No.	Name	Size (Acres)
1	Albemarle Lake	749
2	Ballard County Wildlife Management Area (WMA) Mitchell Tract	245
3	Bohemia Wildlife Management Area	33,000
4	Centennial Lake	352
5	Chotard Lake	980
6	Delta National Wildlife Refuge (NWR)	48,788
7	DeSoto Lake	1,525
8	Dorena Access Area	4
9	Gassoway Lake	800
10	Glasscock Lake	1,773
11	Horn Lake	30
12	Horseshoe Lake	1,200
13	Issaquena Wildlife Management Area	13,000
14	Joseph Hunter Moore Access	10
15	Lake Beulah	980
16	Lake Lee	1,096
17	Lake Mary	2,250
18	Lake Whittington	4,000
19	Mississippi River	(954 Miles)
20	New Madrid Bend Access	7
21	Old River Lake	4,160
22	Palmyra Lake	1,773
23	Pass A'Loutre Waterfowl Management Area	65,000
24	Rodney Lake	666
25	Red River Wildlife Management Area	16,977
26	S. P. Reynolds Access Area	--
27	St. Francis National Forest	20,600
28	Tunica Cut-Off	3,152
29	Yucatan Lake	1,997
30	White River National Wildlife Refuge	113,000



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 1

FIGURE 8

HISTORY

Recorded history of WRPA 1 is inseparable from that of adjacent areas and towns. Early Europeans who explored the area by means of the Mississippi River found abundant fish and game, which included white-tailed deer, black bear, wild turkey, waterfowl of many types, and many fish species, including sturgeon and paddlefish. After 1700, the first permanent European settlements were located adjacent to the Mississippi and other major rivers because of easy transportation.

As early as 1749, game was reported being depleted in areas around large towns due primarily to overhunting. White-tailed deer, wild turkey, black bear, and many types of waterfowl were reduced to low numbers, but most small game recovered because of their reproductive capacities. During these early times, fish resources remained in high production even though many species were eliminated.

Prior to 1930, when extensive flood control projects were initiated on the main stem, the Mississippi River meandered over a flood plain nearly 80 miles wide in some reaches, overflowing its main channel frequently. The productivity of a flood plain is dependent on the periodic overflow which occurs, and the extent and quality of its fish and wildlife habitat are generally inversely parallel to the degree of flood protection and drainage provided. Thus, with no flood protection, WRPA 1 provided diverse and abundant game and fish. Flood control works reduced habitat quality and quantity and game populations, but wildlife protection and management have counterbalanced the loss so that today many species of game have made significant and, in some cases, complete comebacks.

Fish in WRPA 1 have not fared so well. Flood control has seriously reduced productivity of the fisheries and combined with a high demand for commercial fish has resulted in depletion of many species of fish. Today, paddlefish and sturgeon are essentially gone and commercial fishing is a fraction of what it was in the past, primarily because of quality habitat reduction.

HABITAT

Water Resources

The Mississippi River is the only stream in WRPA 1 and it supplies 954 miles of stream habitat. Because of the river characteristics (depth, velocity, and turbidity) sport fishing is limited mostly to catfish.

Sixteen major oxbow lakes located within the WRPA provide 25,000 acres of fishery habitat. In addition, there are numerous other small lakes scattered throughout WRPA 1. Most lake habitat is in the northern half of the region where the batture land is extensive. Lake fishing is nonexistent below Baton Rouge, Louisiana. Area lakes are highly productive because of periodic overflow, making available large amounts of nutrients and spawning areas. Lake fish sought by sport fishermen include largemouth, white and yellow bass, black and white crappie, bluegill and other sunfish, bullhead and other catfish, and carp.

Figure 8 shows the water and land resources and facilities devoted to fish and wildlife in WRPA 1.

Land Resources

Commercial forest land within WRPA 1 amounts to 879,000 acres, almost 56 percent of the total land use. The larger portion of the land is owned by forest industries and the remainder is individually owned.

The two major forest types in the WRPA are oak-gum-cypress and elm-ash-cottonwood. High soil fertility, abundant mast, and adequate water make these bottomland hardwood forests some of the most productive deer and turkey habitat in the Nation. White-tailed deer sometimes exceed carrying capacity, while turkey are approaching carrying capacity in many areas. Black bear is available in many areas, yet bears are not common. The habitat is well covered with nutritious ground cover such as dewberry, poison ivy, green briar, trumpet vine, and pepper vine. The area's wetlands serve as habitat for common fur-bearing animals such as mink, raccoon, and opossum.

All of WRPA 1 falls in the Mississippi Flyway and contains habitat important to both migrating and wintering waterfowl. The river, oxbow lakes, and surrounding wetlands constitute important waterfowl habitat for nearly all species of ducks and geese. In addition to ducks and geese, coot, snipe, and gallinule are found.

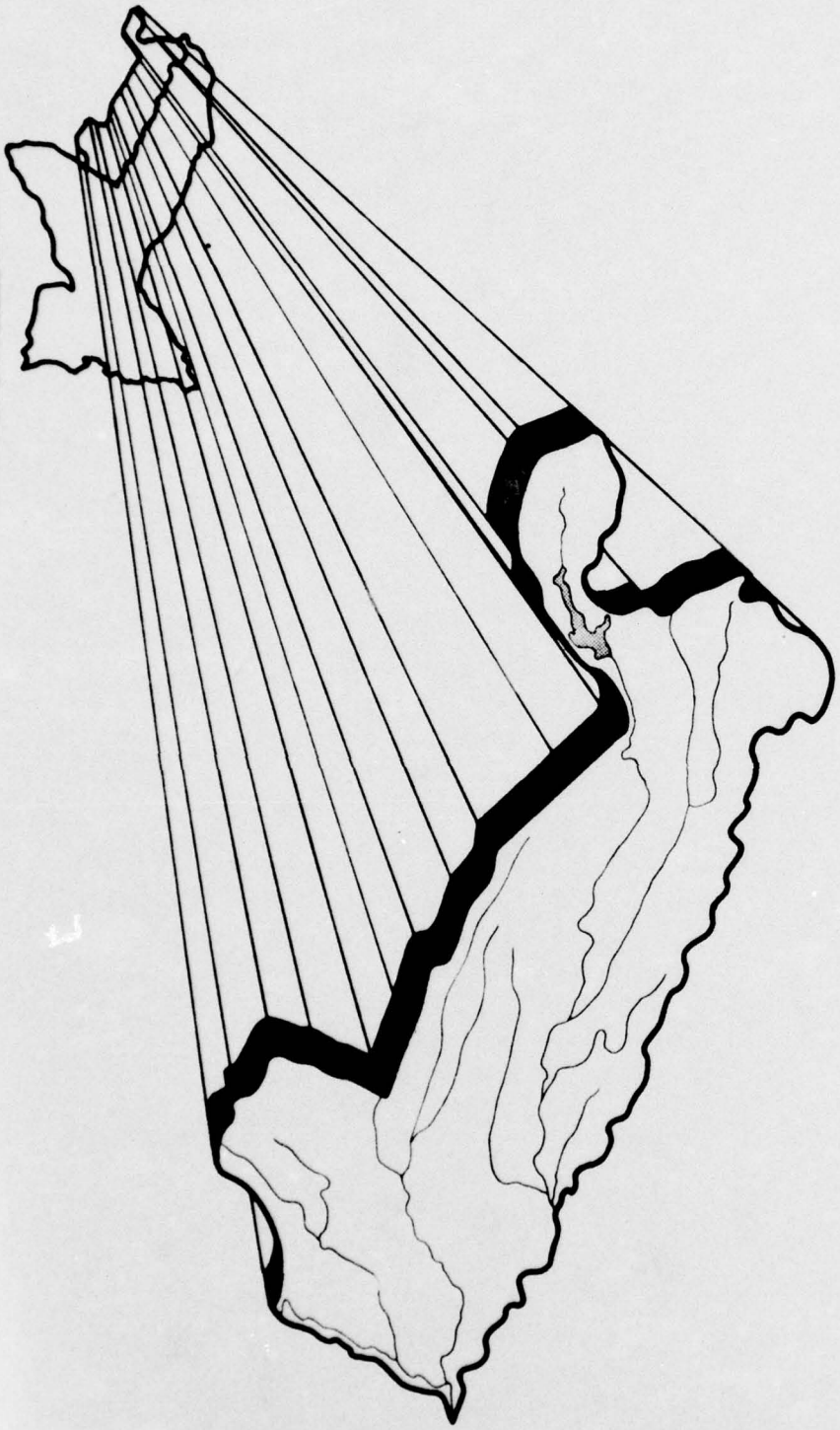
Since the land is subject to flooding throughout the annual growing season, row cropping (188,000 acres) is an insignificant land use in the area at this time. However, the high price of row crops, especially soybeans, is encouraging commercial forest landowners to clear timberland in favor of high return row crops. The land is more adaptable to pasture production than crop production, especially along the levees that contain the Mississippi River. The levees themselves are kept free of woody vegetation but support native grasses. In 1970, approximately 197,000 acres of land were utilized for the grazing of livestock in the area. Of this, 32,000 acres are permanent pasture. The remaining acreage is made up of 30,000 acres of pastured cropland and 135,000 acres of pastured forest land. Much of this land is utilized by farmers in adjacent WRPA's for grazing livestock. In addition to forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted are squirrel, rabbit, quail, mourning dove, woodcock, and raccoon.

All types of animals not considered as game, fish, or furbearing animals are considered as other wildlife. Most of the animals, especially birds, are important in satisfying nonconsumptive wildlife uses. Many species of nongame wildlife occur in WRPA 1, utilizing the broad range of habitat.

Lease of hunting and fishing rights to individuals and club units is progressing into an enveloping condition in WRPA 1. Therefore, there is a conversion to restrictive and, in some instances, managed types of hunting and fishing areas.

PRESENT AND FUTURE NEEDS

Needs are not tabulated separately for WRPA 1, but are included with the adjacent WRPA needs.



WRPA 2

W R P A 2

DESCRIPTION

WRPA 2 is located in the northwest corner of the Lower Mississippi Region. It lies in parts of two States - southeast Missouri and northeast Arkansas, containing about 10,702,000 acres of land and water area. It is bounded by the Mississippi River on the east, by the limits of the study area on the north and west, and by the South Bank Arkansas River Levee on the south. Adjacent to WRPA 2 are 247,244 acres of WRPA 1 (figure 9).

There are three major drainage systems within this area - the White, Arkansas, and St. Francis Rivers. The White and Arkansas Rivers drain areas from outside the WRPA and from outside the region.

The topography of the area varies from flat Southern Mississippi Valley Alluvium to rolling Ozark Highlands. The majority of the terrain is flat to slightly rolling.

In 1970, the human population of WRPA 2 was 626,690, and is projected to increase by 2020 to 795,000 and 925,000 under Programs A and B, respectively.

Flooded hardwoods - a prime attraction of mallard ducks.

MAP INDEX

WRPA 2

No.	Name	Size (Acres)
1	Arkansas Post National Monument	220
2	Bayou DeView Wildlife Management Area	4,173
3	Bayou Meto Wildlife Management Area	33,636
4	Ben Cash Memorial Wildlife Management Area	956
5	Big Lake Wildlife Management Area	12,160
6	Big Lake National Wildlife Refuge	11,023
7	Big Oak Tree State Park	1,007
8	Black River Wildlife Management Area	19,314
9	Bradyville Waterfowl Area	269
10	Clark National Forest	226,600
11	Coldwater State Forest	4,647
12	Corning National Fish Hatchery	-
13	Crowley's Ridge State Park	270
14	Dagmar Wildlife Management Area	7,656
15	Duck Creek Wildlife Management Area	6,035
16	Dorena Access Area	4
17	Elephant Rock State Park	131
18	Hallowell Lake Public Fishing Lake	600
19	Joe Hogan State Fish Hatchery	300
20	Lake Des Arc - Public Fishing Lake	300
21	Lake Greenlee - Public Fishing Lake	300
22	Lake Poinsett - Public Fishing Lake	550
23	Mallard Lake - Public Fishing Lake	300
24	Marked Tree Floodway Wildlife Management Area	12,000
25	Mingo National Wildlife Refuge	21,673
26	New Madrid Bend Access Area	7
27	Sam A. Baker State Forest	5,138
28	St. Francis Backwater Wildlife Management Area (Proposed)	
29	St. Francis Lake Wildlife Management Area (Proposed)	
30	St. Francis National Forest	20,600
31	St. Francis Sunken Lands Wildlife Management Area	14,700
32	Trusten Holder Wildlife Management Area	4,321
33	Tywappity Community Lake	120
34	Wappapello Access Area (13 sites) @ 2 acres	26
35	Wapanocca National Wildlife Refuge	5,485
36	Wattensaw Wildlife Management Area	16,653
37	White River National Wildlife Refuge	113,000

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 2

FIGURE 9

HISTORY

In 1541, De Soto led the first European explorers into the area and reported finding large numbers of buffalo, elk, deer, turkey, cougar, and bear. In the late 1700's, settlers began to exploit the big game and timber resources, resulting in a decline of big game from this overhunting and land clearing. Elk and buffalo were eliminated. At one time during the 1930's, only 500 deer were counted in the entire State of Arkansas. Today, due to land clearing for agricultural operations, only small remnants remain of the forests that were once called the "Great Swamp." Concurrently with the conversion of forest lands to agricultural lands, big game as well as nongame animals were diminished.

Removal of forest cover eliminated the filtering effect on water supply and water quality, with consequent losses in fish productivity. Faced with these problems, Arkansas set up its first State fish and wildlife department in 1915. In 1936, Missouri created a new department of conservation dedicated to the reclamation of the State's fish, wildlife, and forestry resources.

Under intensive management, many of the reduced fish and wildlife populations have made a comeback. Species such as buffalo, elk, bear, and lion will not return to levels comparable to those in the 1500's, but deer and turkey are making substantial recoveries. Deer populations are now as high or higher than they were before European settlement, due mainly to proper management.

Commercial fishing and hunting were important to early settlers. While commercial use of fur-bearing animals is relatively insignificant today, commercial fishing is important as a source of annual income. As with sport fishing, commercial fishing has been affected by man's settlement and his water and land-use practices.

HABITAT

Water Resources

There are 1,203 miles of streams in WRPA 2 which are capable of supporting a fishery resource. Major streams include the Arkansas, White, Cache, L'Anguille, St. Francis, Little, and Castor Rivers, and Bayou Meto, all warmwater streams.

Lowland streams in Arkansas are characterized as being slow moving, turbid, and polluted, with game fish populations consisting mainly of catfish and some crappie. The Arkansas and White Rivers are exceptions as these two rivers have good water quality and habitat and support excellent game fish populations.

Upland streams in the Missouri portion of WRPA 2 provide good to excellent fish habitat. The St. Francis River above Wappapello Lake is an excellent float stream and supports good populations of smallmouth bass. Lowland streams in Missouri are of fair quality. While most of this habitat has been channelized, the channel substrate is hard sand and retains fish habitat values better than substrates in the lower parts of the region. Stream fishes sought by sport fishermen include largemouth, spotted, smallmouth, rock and white bass; crappie; bluegill and other sunfish; and bullhead and other catfish. Other species of minor importance are caught and frequently kept.

There are 98,000 acres of lakes between 2 and 40 acres in size and 91,000 acres of lakes over 40 acres in size in WRPA 2. Natural low areas, borrow pits, oxbow lakes, navigation pools, reservoirs, and "blue holes" (deep holes washed out on the downstream side of levee crevasses) are the various types of lake habitat found in WRPA 2. Oxbow lakes are probably the most important to the sport fishermen. Oxbows vary in quality, generally in relationship to surrounding land-use practices. Major Mississippi River oxbow lakes in WRPA 2 are Old Town Lake and Horseshoe Lake. Lake Wappapello is currently the only major reservoir in WRPA 2. Overall lake habitat quality is good. Lake fish sought by sport fishermen include largemouth bass, bluegill, crappie, redear sunfish, other sunfish, bullhead, catfish, and white and yellow bass. Many other species, game and nongame, are present in the area and are occasionally taken by fishermen.

WRPA 2 contains 52,000 acres of pond habitat. Ponds are most often associated with farm or ranch operation, are stocked with hatchery-reared fish, and have the capabilities of satisfying large amounts of fishing per surface acre. The average pond size is probably just under 2 acres. Ponds are more numerous in upland areas but more fertile in the bottomlands. Overall pond habitat quality is good. Pondfish include largemouth bass, bluegill, redear sunfish, crappie,

other sunfish, bullhead, and catfish. Where pond management occurs, largemouth bass, bluegill, redear sunfish, and channel catfish are the primary species stocked.

WRPA 2 ranks first in the region in the harvest of wild freshwater fish and second in catfish and crayfish farming.

Figure 9 shows water and land resources and facilities devoted to fish and wildlife in WRPA 2.

Land Resources

In 1970, commercial forest occupied 2,634,000 acres, or 25 percent of the total land area. Commercial forest includes an aggregate of 2,184,000 acres of privately owned and 450,000 acres of publicly owned forests. Clark, Ozark, and St. Francis National Forests comprise 54 percent of all the public commercial forest land.

The five major forest resource types represent a broad spectrum of softwoods and hardwoods. The most common types are oak-hickory and oak-gum-cypress. The oak-hickory forests are located primarily in the north-central portion of the WRPA; oak-gum-cypress occurs on the moisture-rich soils of flood plains of major streams. Elm-ash-cotton-wood type occurs in the same general region on the better-drained terraces of the flood plains, and oak-pine and loblolly-shortleaf pine types occur in the northwestern portion of the WRPA.

There are over 1.1 million acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. There are over 1.3 million acres of upland hardwood forest which are productive big game habitat and second in mast production only to the bottomland hard-wood forests. These forests constitute high quality deer and turkey range. There are 143,000 acres of pine hardwood habitat and more than 57,000 acres of pine habitat in the WRPA.

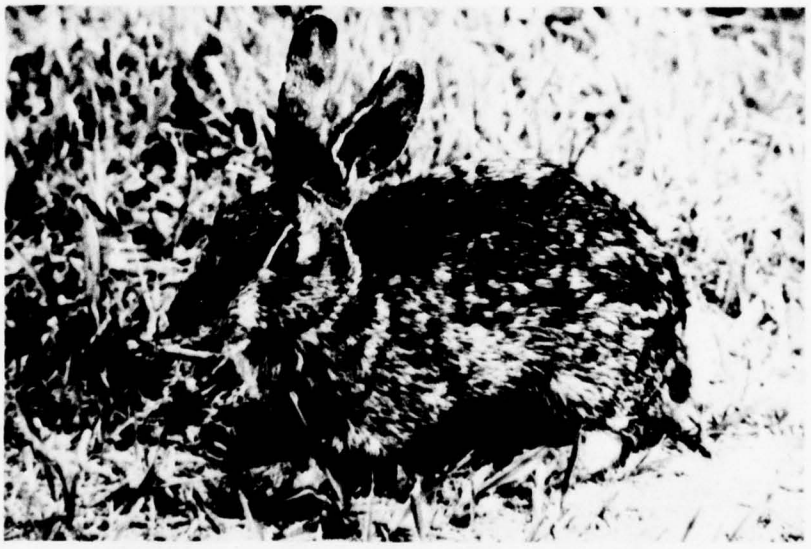
The wildlife resource ranges from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Delta bottomlands are capable of averaging one deer per 20 acres. Upland hardwoods, pine hardwoods, and pine-type forests have medium to low densities of deer, about one deer per 100 to 200 acres. Turkeys are found in low to medium abundance ex-cept in a few specific areas such as the White River National Wildlife Refuge. Black bear, limited in numbers, are found mainly in two restricted areas - the White River National Wildlife Refuge and por-tions of Wayne and Iron Counties, Missouri. There are approximately 100 black bear on the White River National Wildlife Refuge.

Most of WRPA 2 falls in the Mississippi Flyway and contains habitat important to waterfowl. There are 101,000 acres classified as wetlands which constitute important waterfowl habitat. With the exception of some wood ducks, nearly all waterfowl species are migratory and utilize WRPA 2 as a wintering area. Duck species commonly hunted are mallard, wood duck, teal, pintail, gadwall, widgeon, shoveler, ringneck, black, and hooded merganser. Goose hunting occurs in the Missouri portion of the WRPA. In addition to waterfowl, the wetlands serve as habitat for mink, muskrat, beaver, gray fox, raccoon, and opossum.

There are 1,438,000 acres of pastureland in WRPA 2. Of this, 693,000 acres are permanent pasture. The remaining acreage is made up of 380,000 acres of pastured cropland and 365,000 acres of pastured forest land. The 1970 cropland use in WRPA 2 is estimated at 6,192,000 acres; however, slightly less than 6,000,000 acres were harvested in 1970. In addition to forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, quail, mourning dove, cottontail rabbit, fox, raccoon, and opossum.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as the bald eagle, golden eagle, river otter, swamp rabbit, water turkey, shortbilled marsh wren, and American alligator (recently introduced).

Figure 9 shows water and land resources and facilities devoted to fish and wildlife in WRPA 2.



Cottontail rabbit - a popular farm game animal.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 2,626,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have exceeded $18 million. Sport fishing needs are expected to increase to 3,468,000 and 4,035,000 angler-days by 2020 under Program A and Program B objectives, respectively (table 8). Table 9 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 1,240,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have exceeded $8 million, excluding the expenditures associated with trapping for fur animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 1,643,000 and 1,912,000 hunter-days by 2020 under Program A and B objectives, respectively (table 10).

Table 11 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 16,472,000 pounds of commercial fish were harvested in WRPA 2. Production is expected to increase to 31,863,000 pounds by 2020 under both Program A and B objectives (table 12).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 580 m.g.d., with about 20 percent withdrawn from ground water and 80 percent taken from surface water. Consumption amounted to 371 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 850 m.g.d. by the year 2020, a 45 percent increase (table 13).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 100 m.g.d., about 60 percent from ground water and the remainder from lakes and streams. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 247 m.g.d. by 2020 (table 14).

Table 8 - Sport Fishing Needs, WRPA 2

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	769	771	862	1,015
	B		834	965	1,181
Lake Fishing	A	1,190	1,203	1,334	1,572
	B		1,292	1,495	1,829
Pond Fishing	A	521	526	584	688
	B		565	654	800
Saltwater Fishing	A	146	148	164	193
	B		159	184	225
Totals	A	2,626	2,648	2,944	3,468
	B		2,850	3,298	4,035

Table 9 - Sport Fishing Habitat Needs, WRPA 2

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	1,203	A	1,049	1,052	1,176	1,385
		B				
Lake (1,000 Acres)	189	A	36	36	40	48
		B		39	45	55
Pond (1,000 Acres)	52	A	26	26	29	34
		B		28	33	40
Estuary (1,000 Acres)[1/]	0	A	(24)	(25)	(27)	(32)
		B		(25)	(27)	(32)
Total Acres	241	A	62	62	69	82
		B		67	78	95

1/ Needs cannot be met in WRPA.

Table 10 - Hunting Needs, WRPA 2

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	197	199	221	260
	B		214	247	302
Small Game	A	645	652	723	851
	B		700	810	991
Waterfowl	A	82	83	92	109
	B		89	103	127
Wildlife-Oriented Recreation	A	320	324	359	423
	B		348	402	492
Totals	A	1,244	1,258	1,395	1,643
	B		1,351	1,562	1,912

Table 11 - Hunting Habitat Needs, WRPA 2

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	1,128	A	1,581	1,596	1,772	2,086
		B		1,716	1,982	2,430
Upland Hardwood	1,306	A	776	784	870	1,024
		B		842	973	1,193
Pine Hardwood	143	A	431	435	483	569
		B		468	541	663
Pine	57	A	86	87	97	114
		B		94	108	133
Cropland "edges"	657	A	407	412	456	536
		B		441	510	561
Pasture	272	A	175	176	195	230
		B		189	219	240
Wetland	101	A	205	208	230	273
		B		223	258	318
Totals	3,566	A	3,661	3,698	4,103	4,832
		B		3,973	4,591	5,538

Table 12 - Present and Future Fish Production Requirements, WRPA 2

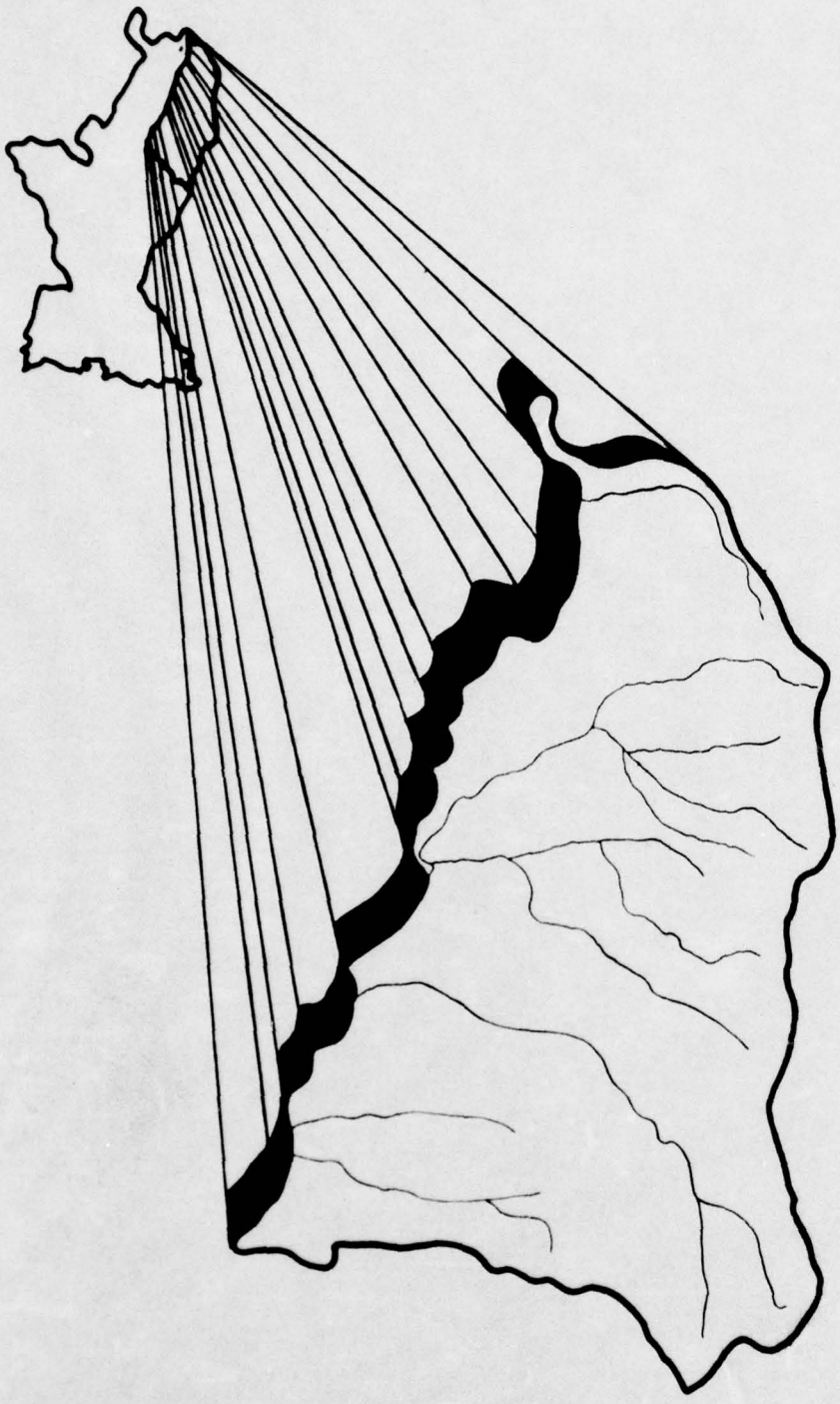
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	6,037	10,435	13,513	19,550	19,669	25,706	25,826	31,863

Table 13 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 2

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
580	371	630	405	740	482	850	560

Table 14 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 2

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
99.9	94.9	130.0	117.0	118.0	169.2	247.0	222.3



WRPA 3

W R P A 3

DESCRIPTION

WRPA 3, the northeast corner of the region, is located in the southwest corner of Kentucky, the western portion of Tennessee, and the extreme northern end of Mississippi. It contains about 6,818,000 acres or approximately 10,650 square miles of land and water area. Adjacent to WRPA 3 are 254,933 acres of WRPA 1 (figure 10).

The principal drainage areas from east of the Lower Mississippi River include the Obion, Forked Deer, Hatchie, and Wolf Rivers, Nonconnah Creek and Loosahatchie River in Tennessee, and Mayfield Creek in Kentucky.

The topography of the area is fairly uniform, ranging from flat lands along the stream bottoms to rolling hills. Some of the uplands, particularly in that half of the area next to the Mississippi River, are fairly flat and well suited for cultivated crops and pastures. The hills become more rolling toward the eastern edge of the area.

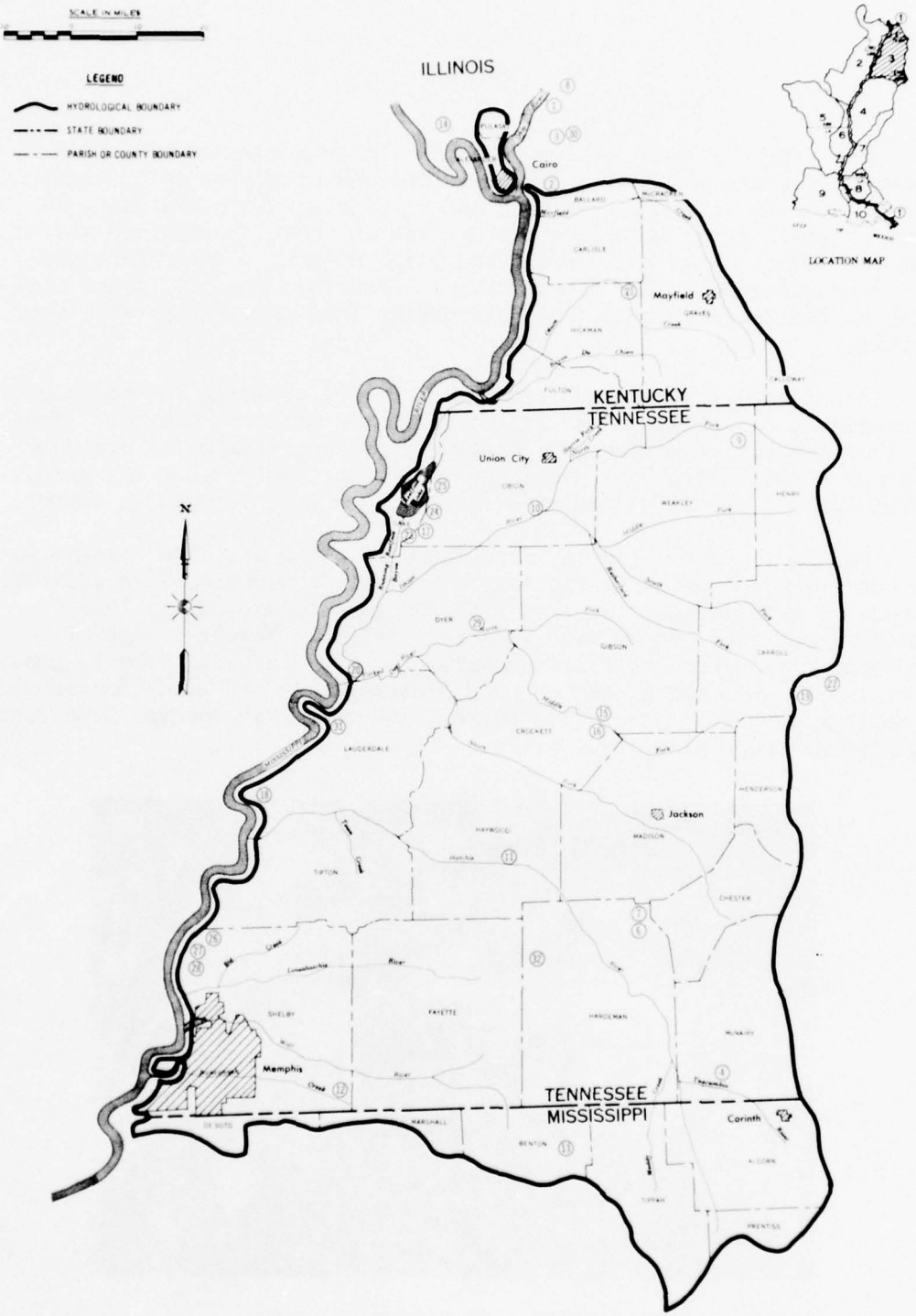
In 1970 the human population of WRPA 3 was 1,258,000, and is projected to increase by 2020 to 2,569,000 and 2,983,000 under Programs A and B, respectively.

Nest boxes for woodducks simulate natural tree cavities.

MAP INDEX

WRPA 3

No.	Name	Size (Acres)
1	Ballard County Wildlife Management Area, (WMA) Headquarters Tract	7,861
2	Ballard County Wildlife Management Area, Mitchell Tract	245
3	Ballard County Wildlife Management Area, Peal Tract	1,576
4	Big Hill Pond Wildlife Management Area	3,000
5	Carroll Lake	100
6	Chickasaw Wildlife Management Area	11,215
7	Chickasaw State Park	250
8	Columbus Belmont Battlefield State Park	--
9	Garrett Lake	183
10	Gooch Wildlife Management Area	6,160
11	Hatchie National Wildlife Refuge	11,035
12	Herb Parsons Lake	177
13	Holly Springs National Forest	7,800
14	Horseshoe Lake State Waterfowl Area	7,901
15	Humbolt Lake	87
16	Humbolt State Fish Hatchery	--
17	Lake Isom National Wildlife Refuge	1,846
18	Lower Anderson Tully Wildlife Management Area	12,000
19	Maples Creek Lake	90
20	Moss Island Wildlife Management Area	3,200
21	Murphys Pond	85
22	Natchez Trace Wildlife Management Area	43,000
23	Reelfoot Lake National Wildlife Refuge	11,626
24	Reelfoot Lake State Park	310
25	Reelfoot Wildlife Management Area	23,750
26	Shelby Forest Wildlife Management Area	20,000
27	Shelby Forest State Park	12,500
28	Shelby Lake	80
29	Tigrett Wildlife Management Area	3,862
30	Turner Lake	100
31	Upper Anderson Tully Wildlife Management Area	18,000
32	Whiteville Lake	158



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 3

FIGURE 10

HISTORY

The first European explorers found the area covered by upland hardwood forests and tall grass prairies. White-tailed deer, black bear, mountain lion, wolf, bison, and wild turkey were abundant, as well as small game, including the prairie chicken. Bottomland and numerous small oxbow lakes attracted large numbers of migratory and resident waterfowl. The first settlers described the tall grass prairies as the "barren lands," but discovered that these areas were very fertile.

After European settlement, extensive land clearing and drainage took place, resulting in the loss of fish and wildlife habitat. This loss of habitat, together with hunting pressure, eliminated big game such as bison, black bear, wolf, and mountain lion. Other big game, birds, forest wildlife, and many fish species were reduced in number.

During the early 1900's, when faced with the possible elimination of many fish and wildlife species, conservation agencies were created. Tennessee established its first fish and game department in 1903, the forerunner of the present Tennessee Wildlife Resources Agency. Kentucky originated its first conservation body in 1912. These agencies were responsible for protecting and managing fish and wildlife resources. Today, white-tailed deer, wild turkey, and many fish species have made substantial population recoveries.

Frog hunting - an offseason sport.

HABITAT

Water Resources

WRPA 3 contains 2,105 miles of stream habitat. Major streams are Mayfield Creek, Obion Creek, Obion River, Forked Deer River, and the Hatchie River, all warmwater streams. Most streams support poor fishing. Of the total 2,105 miles, only 822 miles are classified as fishable. Stream fish commonly sought by sport fishermen include crappie, catfish, bullhead, carp, and sucker. Spotted and largemouth bass, bluegill, and other sunfish are highly desired but are taken in small numbers.

Lake habitat totals 72,000 acres consisting of 32,000 acres of lakes between 2 and 40 acres in size and 40,000 acres of lakes over 40 acres in size. Reelfoot Lake, a natural lake, provides 10,000 acres of fishery habitat. Other major lakes are Open Lake and a 1,000-acre Mississippi River oxbow. Eight publicly owned and managed lakes, averaging 125 acres in size, employ full-time managers and generally require a use permit or fee. Overall lake habitat ranges from excellent for managed and protected areas to fair for nonprotected areas. Lake fish sought by sport fishermen include largemouth bass, bluegill, redear sunfish, crappie, and catfish. Less popular game and nongame fish are other sunfish, bullhead, carp, gar, bowfin, and sucker. The majority of fishermen keep everything they catch.

Pond habitat totals 104,000 acres. Pond sites are abundant and approximately one-half are available to the public, including fee-fishing ponds. Overall pond habitat quality is good. Pond fish include largemouth bass, bluegill, redear sunfish, and channel catfish. Other species may be found.

WRPA 3 ranks sixth in the region for harvest of wild freshwater fish and last in catfish and crayfish farming. Production in terms of pounds harvested per acre of habitat is about the regional average. Buffalofish, catfish, and crappie comprise the majority species harvested.

Figure 10 shows the water and land resources and facilities devoted to fish and wildlife in WRPA 3.

Land Resources

In 1970, commercial forest land occupied 2,310,000 acres, or 34 percent of the total land area. Commercial forest land includes an aggregate of 2,233,000 acres of privately owned and 77,000 acres of federally owned forests. National Forest System lands on the Holly

Springs National Forest comprise 10 percent of all the public commercial forest land.

The forests are grouped into five major forest classifications. The most common types are oak-hickory and oak-gum-cypress. The oak-hickory forests are located in the northeast portion of the WRPA; oak-gum-cypress type covers the moisture-rich soils of flood plains of major streams. Elm-ash-cottonwood type occurs in the same general region on the better-drained terraces of the flood plains and oak-pine and loblolly-shortleaf pine types occur in the southern portion of the WRPA.

There are nearly 800,000 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. There are over 1 million acres of upland hardwood forest which are productive big game habitat and second in game production only to the bottomland hardwood forests. These forests constitute high quality deer and turkey range. There are 124,000 acres of pine hardwood habitat and nearly 174,000 acres of pine habitat in the WRPA. The wildlife resources range from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Deer are hunted throughout most of WRPA 3, while turkey hunting is generally limited to wildlife managed areas or their immediate vicinity.

Most of this WRPA is in the Mississippi Flyway and contains habitat important to waterfowl. There are 41,000 acres classified as wetlands which constitute important waterfowl habitat. The periodically flooded woodlands and swamps, interwoven by old meandering river channels, create ideal waterfowl feeding and resting areas. State waterfowl areas and private shooting preserves are located throughout the WRPA. Flooded small grain crops, highly productive natural aquatic habitats, and winter-flooded hardwoods provide excellent winter waterfowl habitat. Principal waterfowl species found include mallard, black duck, wood duck, ring-necked duck, pintail, gadwall, green-winged teal, shoveler, canvasback, scaup, and American goldeneye. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, muskrat, raccoon, skunk, fox, opossum, bobcat, and weasel.

In 1970, there were 1,972,000 acres of land utilized for the grazing of livestock within the area. Of this, 929,000 acres are permanent pasture, 746,000 acres are pastured cropland, and 297,000 acres are pastured forest land. The 1970 cropland use in WRPA 3 is estimated at 2,206,000 acres. However, only about 1,700,000 acres were harvested. The forest lands, pasture, and croplands offer habitat to a variety of small game species. Those commonly hunted include quail, mourning dove, cottontail and swamp rabbits, gray and fox squirrels, and raccoon.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including numerous species of songbirds, birds of prey, shorebirds, small mammals, amphibians, reptiles, insects, and other members of the animal phyla.

Figure 10 shows water and land resources and facilities devoted to fish and wildlife in WRPA 3.

Wild turkey - a prized big game species.

Murphy's Pond, Hickman County, Kentucky, is a unique area enjoyed by many nature observers.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 5,271,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $27 million. Sport fishing needs are expected to increase to 11,206,000 and 13,012,000 angler-days by 2020 under Program A and B objectives, respectively (table 15). Table 16 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 2,498,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $16 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 5,311,000 and 6,165,000 hunter-days by 2020 under Program A and B objectives, respectively (table 17). Table 18 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 1,789,000 pounds of commercial fish were harvested in WRPA 3. Production is expected to increase to 3,289,000 pounds by 2020 under both Program A and B objectives (table 19).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 33 m.g.d., with about 20 percent withdrawn from ground water and 80 percent taken from surface water. Consumption amounted to 32 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 248 m.g.d. by 2020 (table 20).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 4 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 18 m.g.d. by 2020 (table 21).

Table 15 - Sport Fishing Needs, WRPA 3

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	1,543	1,760	2,401	3,280
	B		1,933	2,729	3,809
Lake Fishing	A	2,389	2,726	3,717	5,079
	B		2,994	4,226	5,898
Pond Fishing	A	1,045	1,193	1,626	2,222
	B		1,310	1,849	2,580
Saltwater Fishing	A	294	335	457	625
	B		368	520	725
Totals	A	5,271	6,014	8,201	11,206
	B		6,605	9,324	13,012

Table 16 - Sport Fishing Habitat Needs, WRPA 3

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	822	A	2,105	2,401	3,275	4,474
		B		2,637	3,723	5,196
Lake (1,000 Acres)	72	A	72	83	113	154
		B		91	128	179
Pond (1,000 Acres)	104	A	52	60	81	111
		B		66	92	129
Estuary (1,000 Acres)[1/]	0	A	(49)	(56)	(76)	(104)
		B		(61)	(87)	(121)
Total Acres	176	A	124	143	194	265
		B		157	220	308

1/ Needs cannot be met in WRPA.

Table 17 - Hunting Needs, WRPA 3

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	395	450	614	840
	B		495	699	974
Small Game	A	1,295	1,477	2,014	2,753
	B		1,622	2,290	3,196
Waterfowl	A	165	188	257	351
	B		207	292	408
Wildlife-Oriented Recreation	A	643	733	1,000	1,367
	B		805	1,137	1,587
Totals	A	2,498	2,848	3,885	5,311
	B		3,129	4,418	6,165

Table 18 - Hunting Habitat Needs, WRPA 3

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	751	A	3,005	3,619	4,928	6,740
		B		3,971	5,608	7,817
Upland Hardwood	1,216	A	1,475	1,777	2,419	3,309
		B		1,949	2,753	3,838
Pine Hardwood	124	A	819	987	1,344	1,838
		B		1,083	1,529	2,132
Pine	174	A	164	197	269	367
		B		217	306	426
Cropland "edges"	2,066	A	810	931	1,269	1,734
		B		1,022	1,443	2,013
Pasture	929	A	347	399	544	743
		B		438	618	863
Wetland	41	A	413	470	643	878
		B		518	730	1,020
Totals	5,301	A	7,033	8,380	11,416	15,609
		B		9,198	12,987	18,109

Table 19 - Present and Future Fish Production Requirements, WRPA 3

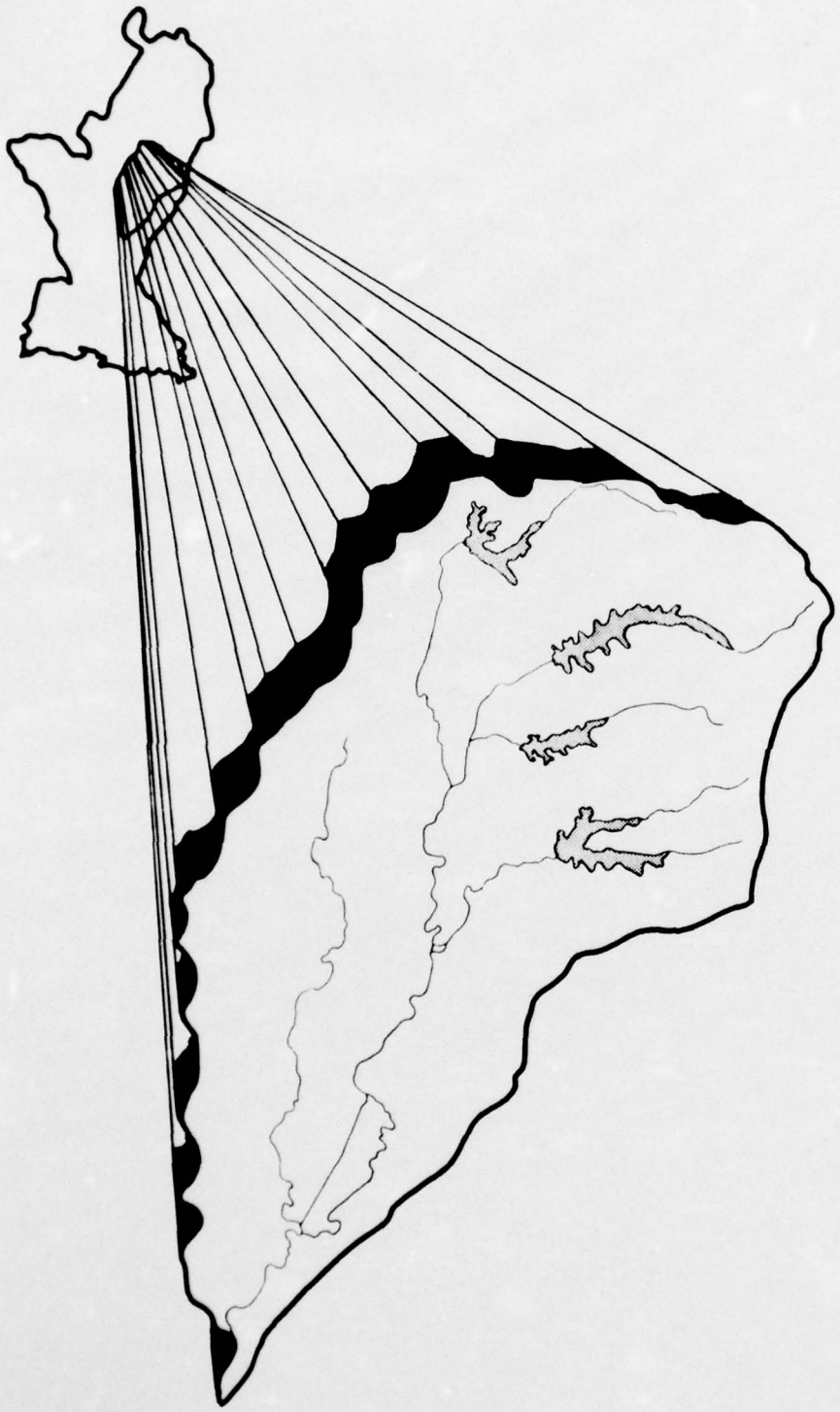
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	1,398	391	691	2,089	1,291	2,689	1,891	3,289

Table 20 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 3

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
33	32	76	70	162	77	248	77

Table 21 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 3

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
3.7	3.5	6.6	6.0	12.4	11.1	18.1	16.1



WRPA 4

W R P A 4

DESCRIPTION

WRPA 4 is located along the east side of the Mississippi River in northwest Mississippi and contains most of the alluvial valley land in the State. It contains approximately 8,547,000 acres of land and water area or about 13,355 square miles. Adjacent to WRPA 4 are 408,506 acres of WRPA 1 (figure 11).

The major drainage system is the Yazoo River. The principal tributaries to the system include the Coldwater, Tallahatchie, Yocona, Yalobusha, and Sunflower Rivers, and Steele Bayou.

The topography of the area varies from the flat Southern Mississippi Valley alluvium to the rolling bluff hills of the Southern Mississippi Valley uplands. The Southern Coastal Plains area on the eastern side of the WRPA is gently rolling.

In 1970, the human population of WRPA 4 was 637,000, and is projected to increase by 2020 to 828,000 and 941,000 under Programs A and B, respectively.

Crappie fishing is excellent in many area lakes.

MAP INDEX

WRPA 4

No.	Name	Size (Acres)
1	Arkabutla Public Access (Ramps, 6)	-
2	Arkabutla Waterfowl Area	2,200
3	Calhoun County Wildlife Management Area	9,000
4	Carver Point State Park	750
5	Coldwater Public Access (Ramp)	-
6	Delta National Forest	59,000
7	Dumas Lake	32
8	Eagle Lake Public Access (Ramp)	-
9	Enid Lake Public Access (Ramp)	-
10	Enid Lake Wildlife Management Area (Proposed)	
11	Grenada Waterfowl Area	7,500
12	Grenada State Refuge	2,750
13	Grenada Public Access (Ramp)	-
14	Hillside Floodway National Wildlife Refuge	15,600
15	Holly Springs National Forest	115,600
16	Hugh White State Park	740
17	Indian Bayou Waterfowl Area	500
18	Issaquena Wildlife Management Area	13,000
19	Kyle State Park	740
20	Lake Bolivar	662
21	Lake Ferguson	-
22	Lake Lee Public Access (Ramp)	-
23	Lake Washington Public Access (Ramp)	-
24	Leflore County Waterfowl Area	350
25	Leroy Percy State Park	2,442
26	Moon Lake Public Access (Ramp)	-
27	O'Keefe Waterfowl Area	5,000
28	Sardis Lake Public Access (Ramps, 14)	-
29	Sardis Waterfowl Area	5,200
30	Sardis Waterfowl Refuge	1,800
31	Sunflower Wildlife Management Area	59,000
32	Sunflower Waterfowl Area	1,600
33	Upper Sardis Reservoir Wildlife Management Area	4,700
34	Tallahatchie River Public Access (Ramp)	-
35	Vicksburg National Military Park and Cemetery	1,740
36	Winterville State Park	40
37	Malmaison Wildlife Management Area	8,000
38	Yazoo National Wildlife Refuge	12,470

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 4

FIGURE 11

HISTORY

Early European explorers seeking furs, hides, and bear oil settled along the high grounds near old natural riverbanks. As these settlements expanded, the demand for timber resources and food products increased, resulting in clearing for timber and conversion of the land to agriculture. These early land use changes helped create one of the highest bobwhite quail populations in the South, but there were accompanying game habitat losses and increased hunting pressures which contributed to the decimation of once abundant populations of white-tailed deer, bear, lion, red wolf, wild turkey, and certain waterfowl species. By 1925 game hunting had reached a low point, and most game populations remained at low levels for some years even though the quail population remained at high levels well into the late 1930's. The Mississippi Game and Fish Commission established hunting seasons in 1932 and has since helped the game to replenish itself. Bear, lion, and wolves have not recovered because these animals require a large range no longer available. Decreases in the quail population in recent years have accompanied the trend toward managed forest land. This trend has similarly affected the squirrel population.

Fish populations remained relatively unchanged from presettlement until the 1900's. Flood control and land drainage have seriously reduced the productivity and availability of the fishery habitat. Some species of fish were eliminated, while others have not recovered. As with sport fishing, commercial fishing has declined significantly.

Large catfish - a diminishing resource.

HABITAT

Water Resources

WRPA 4 contains 1,100 miles of streams which are capable of supporting a fishery resource. There are two distinct types of stream habitat, bottomland and upland. The bottomland streams were once excellent sport fisheries sustained by good water quality, cover, and food. Today, the habitat productivity of these streams has been reduced so they now support mostly gizzard shad, orange spotted sunfish, and channel catfish. The quality of upland stream habitat is better than bottomland stream habitat and supports more game species for sport fishing. Stream fish sought by sport fishermen include largemouth, white, and spotted bass; bluegill and other bream species; crappie; bullhead; catfish; and chain pickerel. Other species are caught and frequently kept.

Located throughout WRPA 4 are 133,000 acres of lakes between 2 and 40 acres in size and 74,000 acres of lakes over 40 acres in size. Mississippi River oxbows, Corps of Engineers reservoirs containing over 84,000 average recreation acres, and one publicly owned and managed lake provide the lake habitat available for fishing by area residents. Most of the oxbow lakes are highly productive because of backwater flooding and have good water quality and habitat. While the major purpose of the reservoirs is flood control, they are heavily fished by area residents. All are warmwater habitat with moderate turbidity. Lake fish sought by sport fishermen include largemouth, white, spotted, and yellow bass; bluegill, redear, and other sunfish; crappie; bullhead and other catfish; gar; and carp.

Pond habitat totals 54,000 acres. Bottomland pond habitat is generally of poor quality, while upland pond habitat is generally of good quality. The most popular pond fish sought by sport fishermen include largemouth bass, bluegill, and channel catfish.

WRPA 4 ranks third in the region in commercial fish farming and fifth for harvest of wild freshwater fish. Buffalofish and catfish are the two major species harvested.

Figure 11 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land in WRPA 4 amounts to 3,222,000 acres, almost 35 percent of total land use. This includes 2,822,300 acres of privately owned and 391,700 acres of publicly owned forests. National Forest

System lands on the Holly Springs, Delta, and Tombigbee National Forests comprise 30 percent of all the public commercial forest land.

The forests have been typed into five major forest classifications which represent a broad spectrum of softwood and hardwood resources. The most common types are oak-hickory and oak-gum-cypress. The remaining forests are loblolly-shortleaf pine, oak-pine, and elm-ash-cottonwood.

There are 1,148,000 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 1,242,000 acres. These forests constitute high quality deer and turkey range. There are 384,000 acres of pine hardwood habitat and 448,000 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Deer and turkey populations vary throughout the area.

Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 97,000 acres. Most of the puddle ducks, as well as some divers such as lesser scaup and ringnecks, are common in the area; however, mallards and wood ducks make up the majority of the hunter's bag. Other common species are black ducks, American widgeon, pintail, gadwall, and blue and green-winged teal. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, otter, muskrat, raccoon, skunk, beaver, opossum, fox, and bobcat.

In 1970, there were 1,856,000 acres of land utilized for the grazing of livestock within the area. Of this, 943,000 acres are permanent pasture, 326,000 acres are pastured cropland, and 587,000 acres are pastured forest land. The 1970 cropland use is estimated at 3,314,000 acres. However, only about 2,800,000 acres were harvested. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, rail, snipe, and gallinules.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as ospreys, eagles, and American alligators.

Figure 11 shows the water and land resources and facilities devoted to fish and wildlife in WRPA 4.

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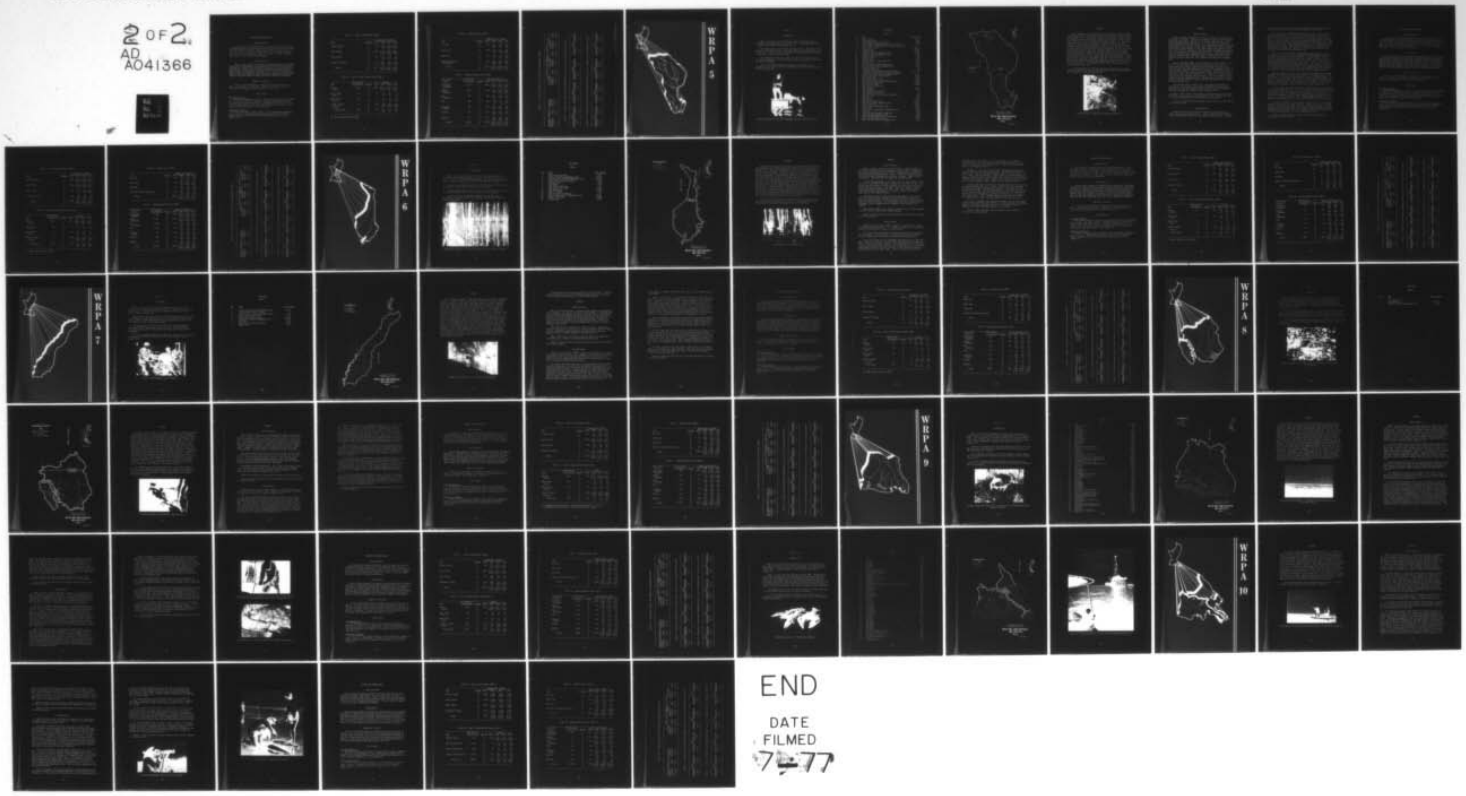

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PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 2,672,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $22 million. Sport fishing needs are expected to increase to 3,611,000 and 4,106,000 angler-days by 2020 under Program A and B objectives, respectively (table 22). Table 23 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 1,266,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $9 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 1,712,000 and 1,946,000 hunter-days by 2020 under Program A and B objectives, respectively (table 24). Table 25 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 7,369,000 pounds of commercial fish were harvested in WRPA 4. Production is expected to increase to 37,388,000 pounds by 2020 under both Program A and B objectives (table 26).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 31 m.g.d., with about 50 percent withdrawn from ground water and 50 percent taken from surface water. Consumption amounted to 23 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 117 m.g.d. by 2020 (table 27).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 71 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 336 m.g.d. by 2020 (table 28).

Table 22 - Sport Fishing Needs, WRPA 4

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	782	790	883	1,057
	B		861	1,002	1,202
Lake Fishing	A	1,211	1,222	1,368	1,637
	B		1,334	1,551	1,861
Pond Fishing	A	530	535	598	716
	B		584	679	814
Saltwater Fishing	A	149	150	168	201
	B		164	191	229
Totals	A	2,672	2,697	3,017	3,611
	B		2,943	3,423	4,106

Table 23 - Sport Fishing Habitat Needs, WRPA 4

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	1,100	A	1,067	1,077	1,204	1,442
		B		1,774	1,366	1,639
Lake (1,000 Acres)	207	A	37	37	41	50
		B		40	47	56
Pond (1,000 Acres)	54	A	27	27	30	36
		B		29	34	41
Estuary (1,000 Acres)[1/]	0	A	(25)	(25)	(28)	(33)
		B		(27)	(32)	(38)
Total Acres	261	A	64	64	71	86
		B		69	81	97

1/ Needs cannot be met in WRPA.

Table 24 - Hunting Needs, WRPA 4

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	200	202	226	271
	B		221	256	308
Small Game	A	656	663	741	887
	B		723	841	1,008
Waterfowl	A	84	85	95	113
	B		92	107	129
Wildlife-Oriented Recreation	A	326	329	368	441
	B		359	417	501
Totals	A	1,266	1,279	1,430	1,712
	B		1,395	1,621	1,946

Table 25 - Hunting Habitat Needs, WRPA 4

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	1,148	A	1,605	1,621	1,813	2,713
		B		1,772	2,055	2,430
Upland Hardwood	1,242	A	788	796	890	1,067
		B		870	1,009	1,193
Pine Hardwood	384	A	438	442	495	593
		B		483	561	663
Pine	449	A	88	88	99	119
		B		97	112	133
Cropland "edges"	728	A	413	417	467	559
		B		455	530	635
Pasture	291	A	177	179	200	239
		B		195	227	272
Wetland	97	A	210	213	238	283
		B		230	268	323
Totals	4,248	A	3,719	3,756	4,202	5,033
		B		4,102	4,762	5,649

Table 26 - Present and Future Fish Production Requirements, WRPA 4

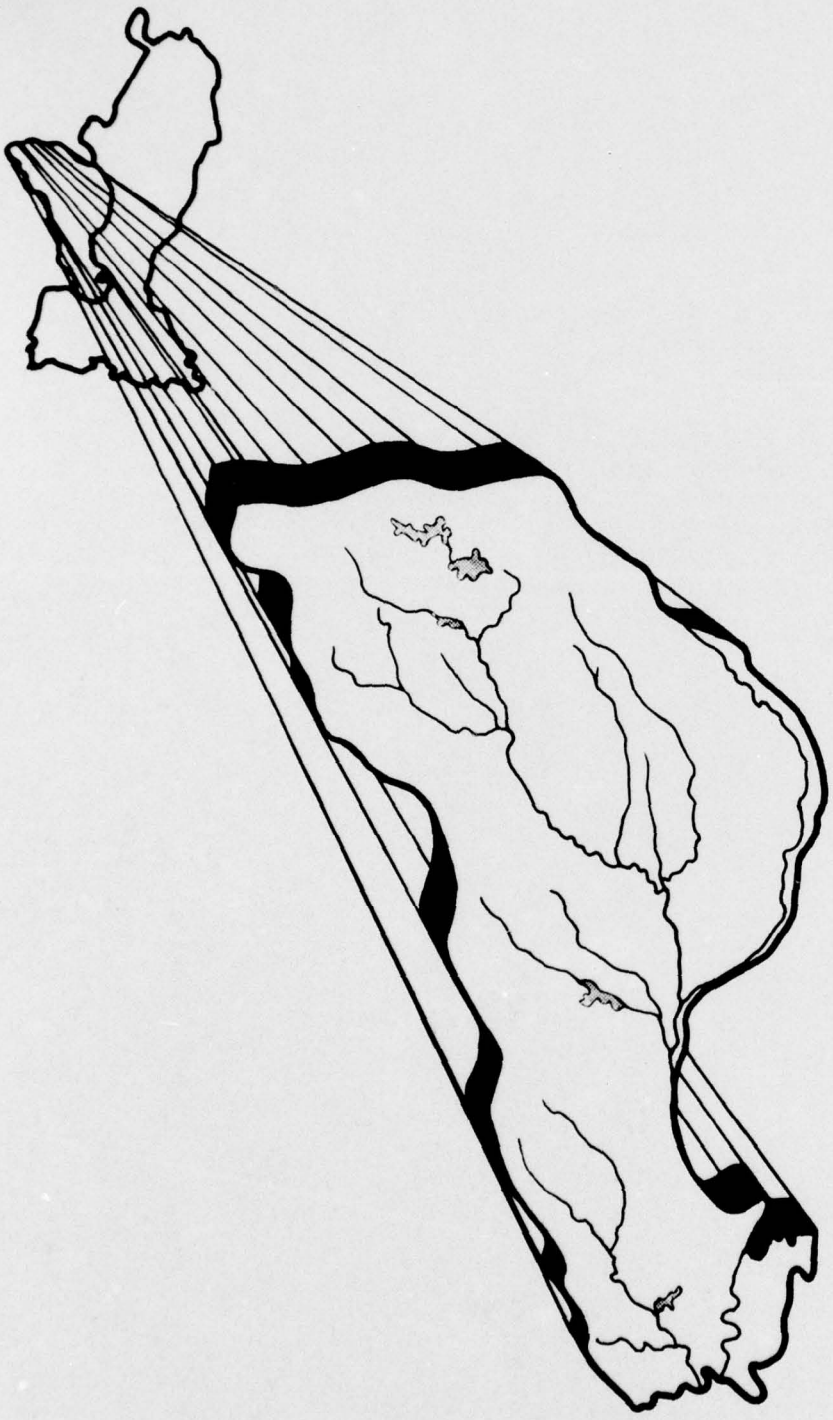
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	2,301	7,369	12,913	15,214	24,000	26,301	35,087	37,388

Table 27 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 4

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
31	23	53	40	83	59	117	82

Table 28 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 4

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
70.6	67.1	123.6	111.2	229.8	206.8	336.0	302.4



WRPA 5

W R P A 5

DESCRIPTION

WRPA 5 is located in south-central Arkansas and north-central Louisiana, containing about 13.1 million acres of land and water area, or about 20,413 square miles (figure 12).

The Ouachita River is the major drainage system. Tributary streams are the Little Missouri River, the Saline River, Bayou Bartholomew, and Little River. The Red River, a drainage system from outside the region, crosses the southern end of the WRPA.

The topography of the area varies from flat river bottomlands to the Ouachita Mountains. Rolling coastal plain hills comprise the majority of the topography.

In 1970, the human population of WRPA 5 was 821,878, and is projected to increase by 2020 to 1,210,000 and 1,377,000 under Programs A and B, respectively.

Fishing opportunities for the largemouth bass are excellent in area.

MAP INDEX

WRPA 5

No.	Name	Size (Acres)
1	Bayou de Siard	1,101
2	Black Bayou Lake	1,645
3	Calion-Public Owned Fishing Lake	500
4	Caney Wildlife Management Area, Corney Division	22,000
5	Caney Wildlife Management Area, Middle Fork Division	
6	Cities Service Area	16,200
7	Caldwell Area	12,123
8	Catahoula Lake	26,880
9	Catahoula Wildlife Management Area	36,117
10	Catahoula National Wildlife Refuge	5,308
11	Chemin a Haut State Park	306
12	Cheniere Brake	2,598
13	Cocodrie Lake	986
14	Concordia Wildlife Management Area	8,525
15	Corney Lake	1,920
16	Cox Creek-Public Owned Fishing Lake	306
17	Cut-Off Creek Wildlife Management Area	8,612
18	Daisy Recreation Area	370
19	D'Arbonne State Park	90
20	D'Arbonne Proposed National Wildlife Refuge	15-20,000
21	Felsenthal National Wildlife Refuge (Proposed)	
22	Georgia Pacific Wildlife Management Area	41,980
23	Grassy Lake Public Shooting Area	11,800
24	Honey Brake Lake	2,842
25	Hot Springs National Park	3,500
26	Jackson-Bienville Wildlife Management Area	31,000
27	Kisatchie National Forest	174,000
28	Lake Bayou D'Arbonne	15,251
29	Lake Catherine State Park	--
30	Lake Claiborne	6,400
31	Lake Concordia	1,050
32	Lake Hamilton State Hatchery	--
33	Lake Ouachita State Park	370
34	Lake Pine Bluffs-Public Owned Fishing Lake	500
35	Lake St. John	2,118
36	Larto Lake	2,176
37	Name Unknown	1,773
38	Ouachita National Forest	484,000
39	Red River Wildlife Management Area	16,977
40	Russell Sage Area	15,000
41	Saline Wildlife Management Area	60,275
42	Saline Lake	1,971
43	Seven Devils Swamp Wildlife Management Area	3,050
44	Shad Lake	1,069
45	Tri-County-Public Owned Fishing Lake	280
46	Union Wildlife Management Area	11,510
47	White Oak Lake-Public Owned Fishing Lake	2,600
48	White Oak Lake-Recreation Area	510
49	White Oak Lake Wildlife Management Area	2,693

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 5

FIGURE 12

HISTORY

Early Europeans, who explored the area, reported finding abundant fish and game which included bear, buffalo, lion, wolf, prairie chicken, ruffed grouse, other small game, and many fish species. Since hunting and trapping were the occupations of the early European settlers, they relied upon the rivers for transporting their products. As the human population grew, so did the demand for timber resources and food products. Large tracts of land were cleared for the timber and then converted into agricultural production, resulting in the loss of fish and game habitat. This population growth and change in land use, along with increased hunting pressure, eliminated buffalo, lion, prairie chicken, and grouse. Other species were severely reduced in number. In 1908 and 1916 the States of Louisiana and Arkansas, respectively, created forerunners of their present game and fish commissions. Through their efforts to protect and manage fish and wildlife resources, some game animals have made substantial comebacks. Buffalo, lion, and wolves have not recovered since the large range required by these animals is no longer available. Deer populations have been reestablished in the lower portion of the area.

Fish populations have not been affected as seriously as wildlife. However, flood control and land drainage have reduced the productivity and availability of the fishery habitat.

Archery offers a high quality hunting experience.

HABITAT

Water Resources

WRPA 5 contains 1,931 miles of streams, of which 1,181 miles are classified as fishable. There are two distinct types of stream habitat, bottomland and upland. The quality of upland stream habitat is good, while bottomland stream habitat is fair. Most rivers provide high quality habitat for stream fishing. All or designated portions of Bayou Bartholomew, Bayou DeLoutre, Corney Bayou, Middle Fork Bayou D'Arbonne, Saline Bayou, Bayou Cocodrie, Fish Creek, Trout Creek, and Big Creek have been cited for inclusion in the Louisiana State natural and scenic river system because of their excellent quality. Stream fish sought by sport fishermen include largemouth, white, yellow, and spotted bass; bluegill and other bream species; crappie; bullhead; catfish; chain pickerel; walleye; and carp. Other species are caught and frequently kept.

Located throughout WRPA 5 are 76,000 acres of lakes between 2 and 40 acres in size and 175,000 acres of lakes over 40 acres in size. Mississippi River oxbows, three Corps of Engineers reservoirs, two Arkansas Power and Light Company reservoirs, three municipal reservoirs, and one natural sump are available for fishing. The different types of lake habitat vary from shallow warmwater to deep cold-water two-story fisheries. While the major purpose of the reservoirs is flood control, they are heavily fished by area residents. Lake fish sought by sport fishermen include largemouth, white, spotted, and yellow bass; bluegill, redear, and other sunfish; crappie; bullhead and other catfish; chain pickerel; and walleye.

Pond habitat totals 68,000 acres. Bottomland pond habitat is generally of poor quality, while upland pond habitat is generally of good quality. The most popular pond fish sought by sport fishermen include largemouth bass, bluegill, and channel catfish.

WRPA 5 ranks fourth in the region in catfish and crayfish farming and fourth in the harvest of wild freshwater fish. Buffalofish, catfish, and freshwater drum are the major species harvested.

Figure 12 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land in WRPA 5 amounts to 10,228,000 acres, almost 78 percent of total land use. This includes 9,299,400 acres of privately owned and 928,600 acres of publicly owned forests. National

Forest System lands on the Kisatchie and Ouachita National Forests comprise nearly 81 percent of all public commercial forest land.

The forests have been typed into six major forest classifications. The most common types are loblolly-shortleaf pine and oak-gum-cypress. The loblolly-shortleaf pine forests cover the western portion of the WRPA. The-oak-gum-cypress type covers the Mississippi delta and flood plains of major streams. The elm-ash-cottonwood type occurs in the same general region on the better-drained terraces of the flood plains. The oak-pine type occurs in the northeastern quarter of the WRPA and borders the Mississippi delta. The oak-hickory type occurs as small forests throughout the northern hill portion of the WRPA, and longleaf-slash pine type is found in the southern quarter.

There are 2,363,000 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 1,991,000 acres. These forests constitute high quality deer and turkey range. There are 2,049,000 acres of pine hardwood habitat and 3,825,000 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Deer and turkey populations vary throughout the area.

Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 791,000 acres. The most popular waterfowl species include mallard, pintail, teal, and wood duck. Open fields in the alluvial bottomlands are drawing a number of blue, white-fronted, and snow geese. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, muskrat, raccoon, skunk, beaver, opossum, and fox.

In 1970, there were 2,168,000 acres of land utilized for the grazing of livestock within the area. Of this, 982,000 acres are permanent pasture, 239,000 acres are pastured cropland, and 947,000 acres are pastured forest land. The 1970 cropland use is estimated at 732,000 acres. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and snipe.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as Southern bald eagle, Eastern cougar, rare songbirds, and American alligators, although in some southern Louisiana parishes State officials do not consider American alligators as rare or endangered species.

Figure 12 shows the water and land resources and facilities devoted to fish and wildlife.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 3,466,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $24 million. Sport fishing needs are expected to increase to 5,310,000 and 6,042,000 angler-days by 2020 under Program A and B objectives, respectively (table 29). Table 30 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 1,632,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $10 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 2,502,000 and 2,847,000 hunter-days by 2020 under Program A and B objectives, respectively (table 31). Table 32 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 6,235,000 pounds of commercial fish were harvested in WRPA 5. Production is expected to increase to 16,487,000 pounds by 2020 under both Program A and B objectives (table 33).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 254 m.g.d., with about 5 percent withdrawn from ground water and 95 percent taken from surface water. Consumption amounted to 174 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 407 m.g.d. by 2020 (table 34).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 23 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 119 m.g.d. by 2020 (table 35).

Table 29 - Sport Fishing Needs, WRPA 5

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	1,008	1,066	1,258	1,545
	B		1,133	1,426	1,758
Lake Fishing	A	1,561	1,650	1,948	2,392
	B		1,754	2,209	2,723
Pond Fishing	A	683	722	852	1,047
	B		767	966	1,191
Saltwater Fishing	A	214	226	266	326
	B		240	302	370
Totals	A	3,466	3,664	4,324	5,310
	B		3,894	4,903	6,042

Table 30 - Sport Fishing Habitat Needs, WRPA 5

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	1,931	A	1,375	1,454	1,716	2,107
		B		1,545	1,945	2,398
Lake (1,000 Acres)	251	A	47	50	59	72
		B		53	67	83
Pond (1,000 Acres)	68	A	34	36	43	52
		B		38	48	60
Estuary (1,000 Acres)[1/]	0	A	(36)	(41)	(44)	(54)
		B		(41)	(50)	(61)
Total Acres	319	A	81	86	102	124
		B		91	115	143

1/ Needs cannot be met in WRPA

Table 31 - Hunting Needs, WRPA 5

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	258	273	322	395
	B		290	365	450
Small Game	A	846	894	1,056	1,297
	B		950	1,197	1,476
Waterfowl	A	108	114	135	166
	B		121	153	188
Wildlife-Oriented Recreation	A	420	444	524	644
	B		472	594	733
Totals	A	1,632	1,725	2,037	2,502
	B		1,833	2,309	2,847

Table 32 - Hunting Habitat Needs, WRPA 5

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	2,363	A	2,070	2,190	2,584	3,171
		B		2,370	2,929	3,611
Upland Hardwood	1,991	A	1,016	1,075	1,268	1,557
		B		1,142	1,438	1,773
Pine Hardwood	2,049	A	565	597	705	865
		B		635	799	985
Pine	3,825	A	113	119	141	173
		B		127	160	197
Cropland "edges"	971	A	532	563	665	817
		B		599	754	929
Pasture	416	A	228	241	285	350
		B		257	323	398
Wetland	791	A	270	285	338	415
		B		303	383	470
Totals	11,653	A	4,794	5,070	5,986	7,348
		B		5,390	6,786	8,363

Table 33 - Present and Future Fish Production Requirements, WRPA 5

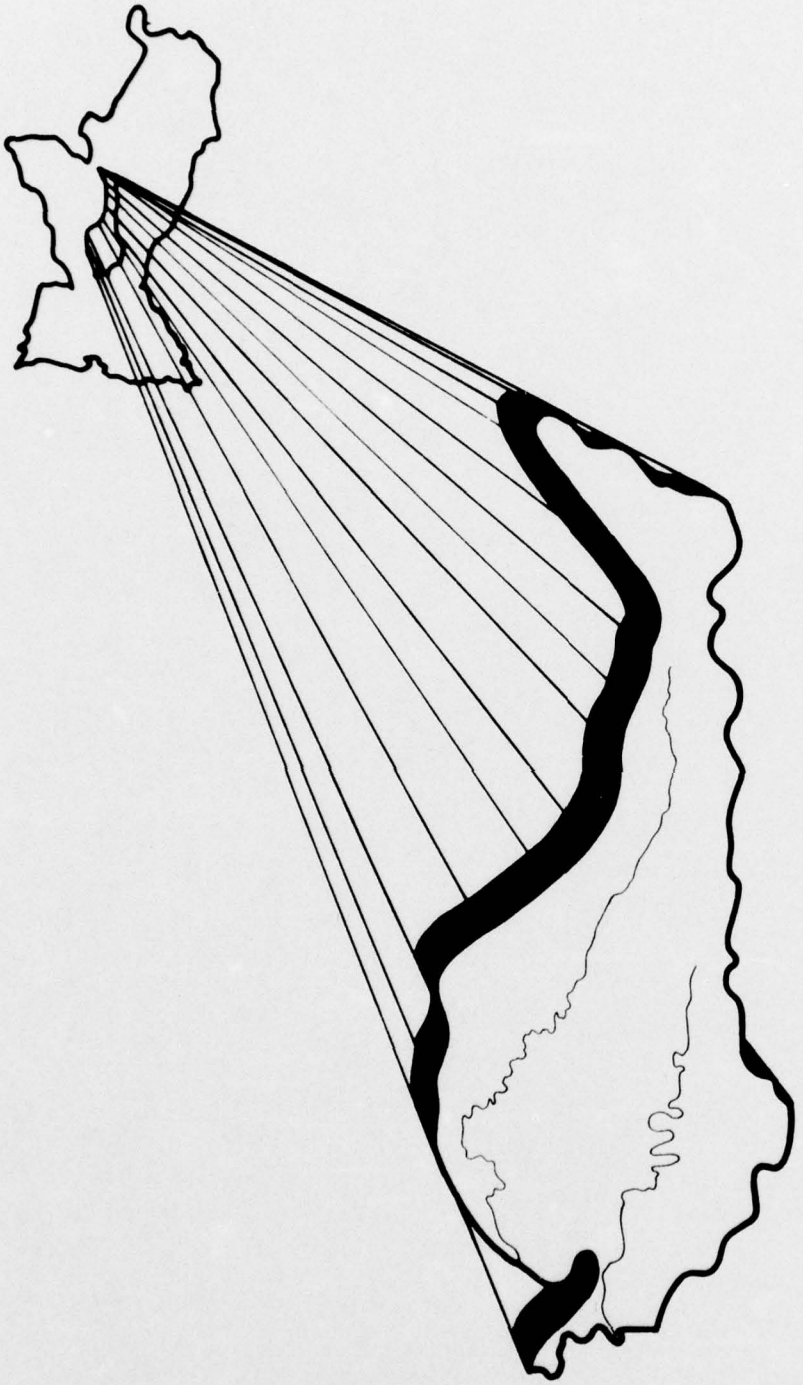
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	3,487	2,748	4,878	8,365	8,739	12,226	13,000	16,487

Table 34 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 5

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
254	174	285	196	345	236	407	280

Table 35 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 5

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
22.4	21.3	40.8	36.7	77.8	70.0	118.6	106.7



WRPA 6

W R P A 6

DESCRIPTION

WRPA 6 is located on the west side of the Mississippi River in southeast Arkansas and northeast Louisiana. This WRPA contains in excess of 3.5 million acres of land and water area, or about 5,520 square miles. Adjacent to WRPA 6 are 370,670 acres of WRPA 1 (figure 13).

The two primary streams of the area are the Boeuf and Tensas Rivers. Bayou Macon is a tributary stream of the Tensas River.

The topography of the area is fairly flat, with about three-fourths of the area being located in the Mississippi Valley alluvium.

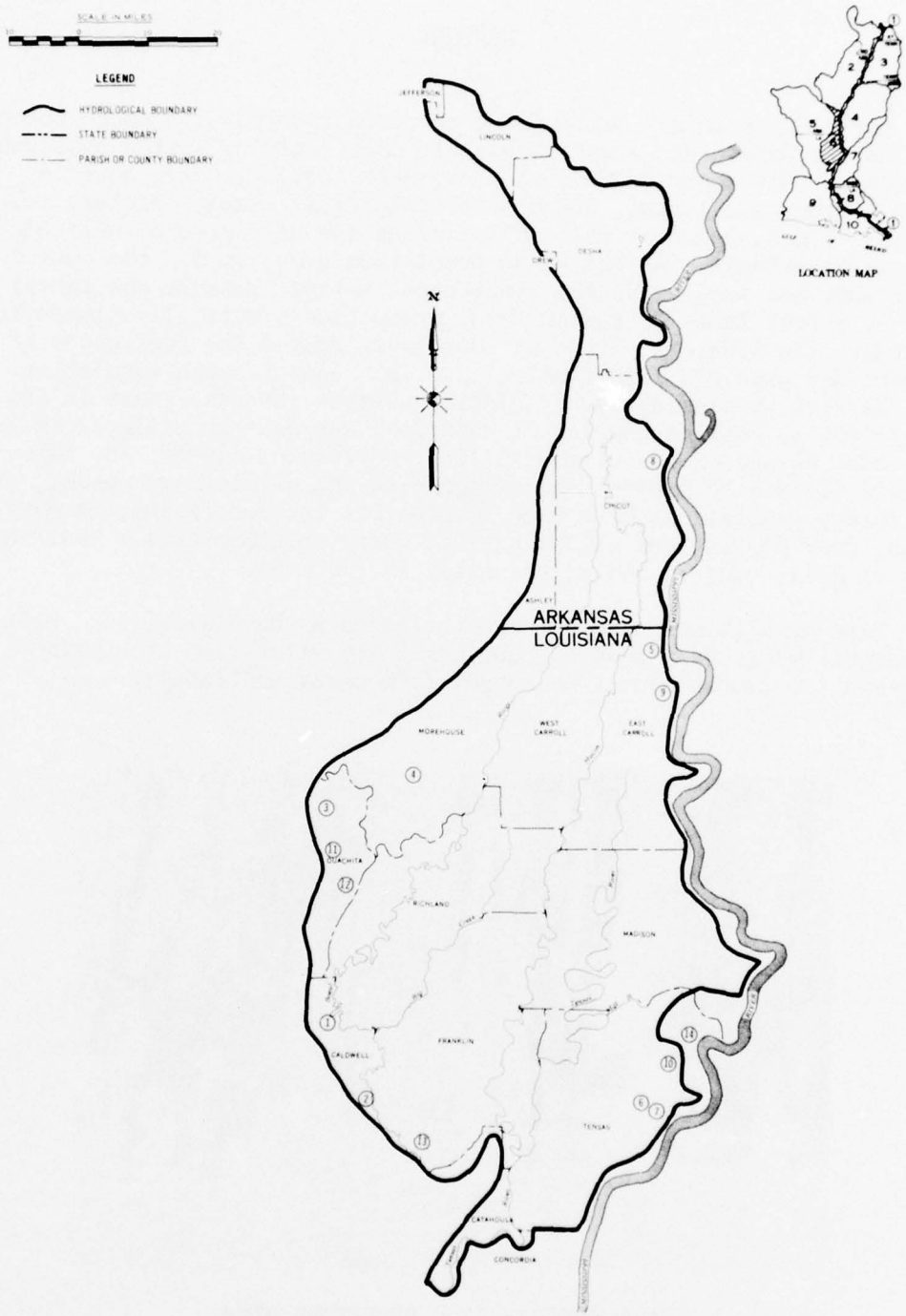
In 1970, the human population of WRPA 6 was 188,395, and is projected to increase by 2020 to 193,000 and 212,000 under Programs A and B, respectively.

Bottomland hardwoods - the most productive fish and wildlife habitat.

MAP INDEX

WRPA 6

No.	Name	Size (Acres)
1	Boeuf River Reservoir	1,216
2	Caldwell Wildlife Management Area	12,123
3	Cities Service Wildlife Management Area	16,400
4	Coulee State Wildlife Refuge	2,110
5	Gassoway Lake	800
6	Lake Bruin	2,342
7	Lake Bruin State Park	45
8	Lake Chicot State Park	6,400
9	Lake Providence	1,230
10	Lake St. Joseph	1,197
11	Monroe State Fish Hatchery	12
12	Russell Sage Wildlife Management Area	14,600
13	Turkey Creek Lake	3,098
14	Yucatan Lake	1,997



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 6

FIGURE 13

HISTORY

Early European explorers found the area covered with dense bottomland hardwoods and an almost impassable understory of switch cane and palmetto. They reported finding bear, deer, cougar, wolf, buffalo, turkey, other small game, and many fish species. Early settlers seeking fur, hides, and bear oil settled along the high grounds near old natural riverbanks. As the human population grew, so did the demand for timber and food products. Increased hunting pressure and conversion of forest lands to agricultural production practically eliminated big game. In 1908, the State of Louisiana created the forerunner of its present day game and fish commission. This agency began regulating game harvest by closing turkey hunting seasons for many years in the early 1900's. Market hunting of waterfowl was declared illegal in 1920. Bear hunting season was closed in 1964 and remains closed. By this State's efforts to protect and manage fish and wildlife resources, deer and turkey populations have made substantial recoveries and, in many areas, deer populations exceed habitat carrying capacities. Small numbers of bear, cougar, and wolves exist in the area.

Fish populations have not been affected as have wildlife. While the quantity has been reduced, due mostly to alteration of habitat, fish species remain almost unchanged from early settlement.

Duck hunting in a greentree area.

HABITAT

Water Resources

WRPA 6 contains 536 miles of stream habitat. Major streams are the Tensas and Boeuf Rivers, Bayou Macon, and Big Creek. The physical and biological characteristics of WRPA 6 streams have been altered so that the overall habitat quality is poor. Stream fish sought by sport fishermen include largemouth bass, crappie, bluegill, redear sunfish, and catfish. Other species are caught and frequently kept.

Located throughout WRPA 6 are 40,000 acres of lakes between 2 and 40 acres in size and 32,000 acres of lakes over 40 acres in size. Nine Mississippi River oxbows and other natural low areas are available for fishing by area residents. Some lakes have severe turbidity problems due to surrounding land-use practices. Lake fish sought by sport fishermen include largemouth bass, bluegill, crappie, and catfish. Other species are caught and kept.

Pond habitat totals 16,000 acres averaging about 1 acre in size. About 75 percent of the ponds are private, resulting from earth removal for other purposes. Bottomland ponds are highly fertile and support an excellent fishery. The most popular pond fish sought by sport fishermen include largemouth bass, bluegill, redear sunfish, and catfish.

WRPA 6 ranks eighth in the region in the harvest of wild freshwater fish and sixth in catfish and crayfish farming.

Figure 13 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land in WRPA 6 amounts to 831,000 acres, almost 25 percent of total land use. This includes 790,000 acres of privately owned and 41,000 acres of publicly owned forests.

The forests have been typed into five major forest classifications which represent a broad spectrum of softwood and hardwood resources. The most common types are elm-ash-cottonwood and oak-gum-cypress.

There are 755,800 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 30,700 acres. These forests constitute high quality deer and turkey range. There are 28,400 acres of pine

hardwood habitat and 16,100 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests to poor in the pine and pine hardwood forests. Deer and turkey populations vary throughout the area.

The WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 85,000 acres. The most popular waterfowl species include mallard, pintail, scaup, coot, and wood duck. Open fields in the bottomlands are drawing a number of blue, white-fronted, and snow geese. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, muskrat, raccoon, skunk, beaver, opossum, and fox.

In 1970, there were 729,000 acres of land utilized for the grazing of livestock within the area. Of this, 494,000 acres are permanent pasture, 118,000 acres are pastured cropland, and 117,000 acres are pastured forest land. The 1970 cropland use is estimated at 1,908,000 acres; however, only 1,600,000 acres were harvested. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and snipe.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as Southern bald eagle, American alligator, and red wolf.

Figure 13 shows the water and land resources and facilities devoted to fish and wildlife.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 800,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $5 million. Sport fishing needs are expected to increase to 852,000 and 936,000 angler-days by 2020 under Program A and B objectives, respectively (table 36). Table 37 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 374,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $3 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 399,000 and 438,000 hunter-days by 2020 under Program A and B objectives, respectively (table 38). Table 39 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 2,272,000 pounds of commercial fish were harvested in WRPA 6. Production is expected to increase to 11,255,000 pounds by 2020 under both Program A and B objectives (table 40).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 67 m.g.d., with about 5 percent withdrawn from ground water and 95 percent taken from surface water. Consumption amounted to 46 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 108 m.g.d. by 2020 (table 41).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 9 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 88 m.g.d. by 2020 (table 42).

Table 36 - Sport Fishing Needs, WRPA 6

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	231	223	226	246
	B		237	237	271
Lake Fishing	A	358	345	349	382
	B		368	367	419
Pond Fishing	A	157	151	153	167
	B		161	160	183
Saltwater Fishing	A	54	52	52	57
	B		55	55	63
Totals	A	800	771	780	852
	B		821	819	936

Table 37 - Sport Fishing Habitat Needs, WRPA 6

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	536	A	315	304	308	335
		B		323	323	369
Lake (1,000 Acres)	72	A	11	10	11	12
		B		11	11	13
Pond (1,000 Acres)	16	A	8	8	8	8
		B		8	8	9
Estuary (1,000 Acres)1/	0	A	(9)	(9)	(9)	(9)
		B		(9)	(9)	(9)
Total Acres	88	A	19	18	19	20
		B		19	19	22

1/ Needs cannot be met in WRPA.

Table 38 - Hunting Needs, WRPA 6

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	59	57	58	63
	B		61	61	69
Small Game	A	194	187	189	207
	B		199	199	227
Waterfowl	A	25	24	24	26
	B		25	25	29
Wildlife-Oriented Recreation	A	96	93	94	103
	B		99	99	113
Totals	A	374	361	365	399
	B		384	384	438

Table 39 - Hunting Habitat Needs, WRPA 6

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	756	A	474	458	464	506
		B		489	489	554
Upland Hardwood	31	A	232	225	228	248
		B		240	240	272
Pine Hardwood	28	A	129	125	127	138
		B		133	133	151
Pine	16	A	26	25	25	23
		B		27	27	29
Cropland "edges"	202	A	123	118	119	130
		B		125	125	143
Pasture	92	A	53	50	51	56
		B		54	54	61
Wetland	85	A	63	60	60	65
		B		63	63	73
Totals	1,163	A	1,100	1,061	1,074	1,171
		B		1,131	1,131	1,283

Table 40 - Present and Future Fish Production Requirements, WRPA 6

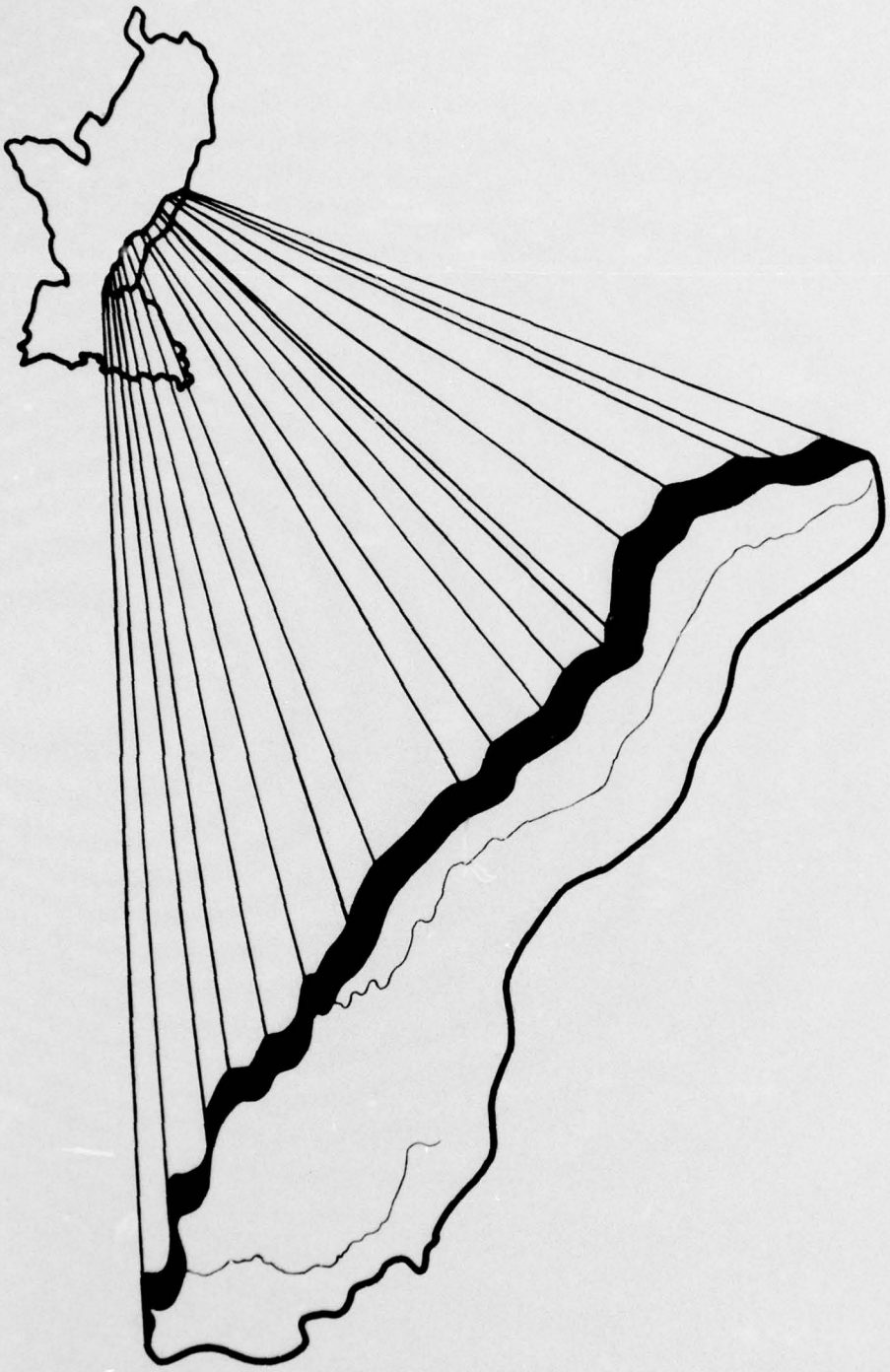
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	1,059	1,213	3,070	4,129	6,583	7,642	10,196	11,255

Table 41 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 6

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
67	46	75	51	91	63	108	76

Table 42 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 6

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
8.7	8.3	24.6	22.1	56.3	50.7	88.1	79.3



WRPA 7

W R P A 7

DESCRIPTION

WRPA 7 is located in central and southwest Mississippi on the eastern side of the region, containing about 4.2 million acres or 6,574 square miles of land and water area. Adjacent to WRPA 7 are 86,400 acres of WRPA 1 (figure 14).

There are two main drainage areas - the Big Black River and a group of independent streams that drain directly into the Mississippi River. These streams include the Homochitto River, Bayou Pierre, Coles Creek, St. Catherine Creek, and the Buffalo River.

The topography of the area varies from flat unleveed Southern Mississippi Valley alluvium to steep bluff hills of the Southern Mississippi Valley uplands. Rolling hills comprise the majority of the topography.

In 1970, the human population of WRPA 7 was 156,496 and is projected to increase by 2020 to 217,000 and 254,000 under Programs A and B, respectively.

Proper game management pays dividends.

MAP INDEX

WRPA 7

No.	Name	Size (Acres)
1	Adams County Wildlife Management Area	16,000
2	Big Black River Public Access	1
3	Copiah County Wildlife Management Area	6,500
4	Holmes County State Park	463
5	Homochitto National Forest	174,100
6	Homochitto Wildlife Management Area	51,500
7	Lake Mary	2,250
8	Natchez Trace National Parkway	8,000
9	Rodney Lake	666

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 7

FIGURE 14

HISTORY

Early European explorers found the area covered with dense hardwoods and pine. In their search for fur, hides, and bear oil, they reported finding abundant fish and game, including bison, bear, wolf, mountain lion, deer, turkey, other small game, and many fish species. As game diminished, the early settlers tried tobacco cultivation, without success, and cotton became the major source of income. Large tracts of land were cleared and placed in production. This loss of habitat resulted in the elimination of big game such as bison, bear, mountain lion, and wolf. Other game was severely reduced in number. By 1925, big game hunting had reached a low point and remained at low levels for some years. In the ensuing years many small farms were abandoned and reverted to wooded habitat which aided in the recovery of deer and turkey populations. The forerunner of the present Mississippi Game and Fish Commission established hunting seasons in 1932, and game began to further replenish itself after that time. Bear, lion, and wolf are found in small numbers since the large range required by these animals is no longer available. Small game populations of quail are now high and mourning dove populations are higher than they ever were. Squirrel populations, which reached a peak prior to the clearing of hardwood forests, are now on the decline, due partly to modern forest management practice and trends toward monoculture.

Angling for stream fish - a high quality experience.

Fish populations have not been affected as have wildlife. However, increased turbidity due to the surrounding land-use practices had adversely affected the productivity of the fishery habitat.

HABITAT

Water Resources

WRPA 7 contains 450 miles of upland streams capable of supporting a fishery habitat. The quality of upland stream habitat is good with most rivers providing high quality habitat for stream fishing. Designated portions of Big Black, Homochitto, and Buffalo Rivers, and Bayou Pierre have been cited for inclusion in the Mississippi State natural and scenic river system because of their excellent quality. Stream fish sought by sport fishermen include largemouth bass, bluegill, crappie, bullhead, and catfish.

Pond habitat totals 14,000 acres, mostly man-made. Upland pond habitat is generally of good quality. The most popular pond fish sought by sport fishermen include largemouth and spotted bass; bluegill, longear, redear, and other sunfish; and channel catfish.

WRPA 7 ranks last in the region among the WRPA's for commercial fish production. Catfish is the major species harvested.

Figure 14 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land in WRPA 7 amounts to 2,509,000 acres, almost 60 percent of total land use. This includes 2,298,000 acres of privately owned and 211,000 acres of publicly owned forests. National Forest System lands on the Homochitto National Forests comprise nearly 71 percent of all public commercial forest land.

The forests have been typed into six major forest classifications. The most common types are oak-hickory and loblolly-shortleaf pine. The oak-hickory forest occurs in the western portion of the WRPA along the bluffs bordering the delta. Oak-pine forests are found bordering the oak-hickory type on the west side of the WRPA and along the eastern boundary of the area, loblolly-shortleaf pine forests occur in the central portion of the WRPA, and oak-gum-cypress type is found on the flood plains of major streams. The elm-ash-cottonwood type occurs in the same general region on the better-drained terraces of the flood plains. A

small amount of longleaf-slash pine type occurs in the southern portion of the WRPA.

There are 449,800 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 799,600 acres. These forests constitute high quality deer and turkey range. There are 455,500 acres of pine hardwood habitat and 754,100 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Deer and turkey populations vary throughout the area.

Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 49,000 acres. The most popular waterfowl species include mallard and wood duck. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, raccoon, skunk, beaver, opossum, and otter.

In 1970, there were 1,815,000 acres of land utilized for the grazing of livestock within the area. Of this, 941,000 acres are permanent pasture, 180,000 acres are pastured cropland, and 694,000 acres are pastured forest land. The 1970 cropland use is estimated at 337,000 acres. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and fox.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such species as American alligator, Eastern cougar, and black bear.

Figure 14 shows the water and land resources and facilities devoted to fish and wildlife.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 664,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $5 million. Sport fishing needs are expected to increase to 958,000 and 1,121,000 angler-days by 2020 under Program A and B objectives, respectively (table 43). Table 44 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed and estimated 280,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $2 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 449,000 and 525,000 hunter-days by 2020 under Program A and B objectives, respectively (table 45). Table 46 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 1,199,000 pounds of commercial fish were harvested in WRPA 7. Production is expected to increase to 3,155,000 pounds by 2020 under both Program A and B objectives (table 47).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 5 m.g.d., about evenly withdrawn from ground water and surface water. Consumption amounted to 4 m.g.d. Future water withdrawal needs for fish and wildlife are expected to increase to about 18 m.g.d. by 2020 (table 48).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 6 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 24 m.g.d. by 2020 (table 49).

Table 43 - Sport Fishing Needs, WRPA 7

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	192	201	231	277
	B		223	268	324
Lake Fishing	A	297	312	357	429
	B		345	416	502
Pond Fishing	A	130	136	156	188
	B		151	182	220
Saltwater Fishing	A	45	47	54	64
	B		52	62	75
Totals	A	664	696	798	958
	B		771	928	1,121

Table 44 - Sport Fishing Habitat Needs, WRPA 7

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	450	A	261	274	315	377
		B		304	365	442
Lake (1,000 Acres)	94	A	9	9	11	13
		B		10	13	15
Pond (1,000 Acres)	14	A	7	7	8	9
		B		8	9	11
Estuary (1,000 Acres)[1/]	0	A	(7)	(8)	(9)	(11)
		B		(9)	(10)	(12)
Total Acres	108	A	16	16	19	22
		B		18	22	26

1/ Needs cannot be met in WRPA.

Table 45 - Hunting Needs, WRPA 7

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	49	52	59	71
	B		57	69	83
Small Game	A	130	169	194	233
	B		187	225	272
Waterfowl	A	21	22	25	30
	B		24	28	35
Wildlife-Oriented Recreation	A	80	84	96	115
	B		93	119	135
Totals	A	280	327	374	449
	B		361	441	525

Table 46 - Hunting Habitat Needs, WRPA 7

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	450	A	370	416	474	570
		B		457	553	666
Upland Hardwood	800	A	181	204	233	280
		B		225	271	327
Pine Hardwood	456	A	101	114	129	155
		B		125	151	182
Pine	754	A	20	23	26	31
		B		25	30	36
Cropland "edges"	517	A	82	106	122	147
		B		118	142	171
Pasture	941	A	35	46	52	63
		B		50	61	73
Wetland	49	A	53	55	63	75
		B		60	70	88
Totals	3,964	A	842	964	1,099	1,321
		B		1,060	1,278	1,543

Table 47 - Present and Future Fish Production Requirements, WRPA 7

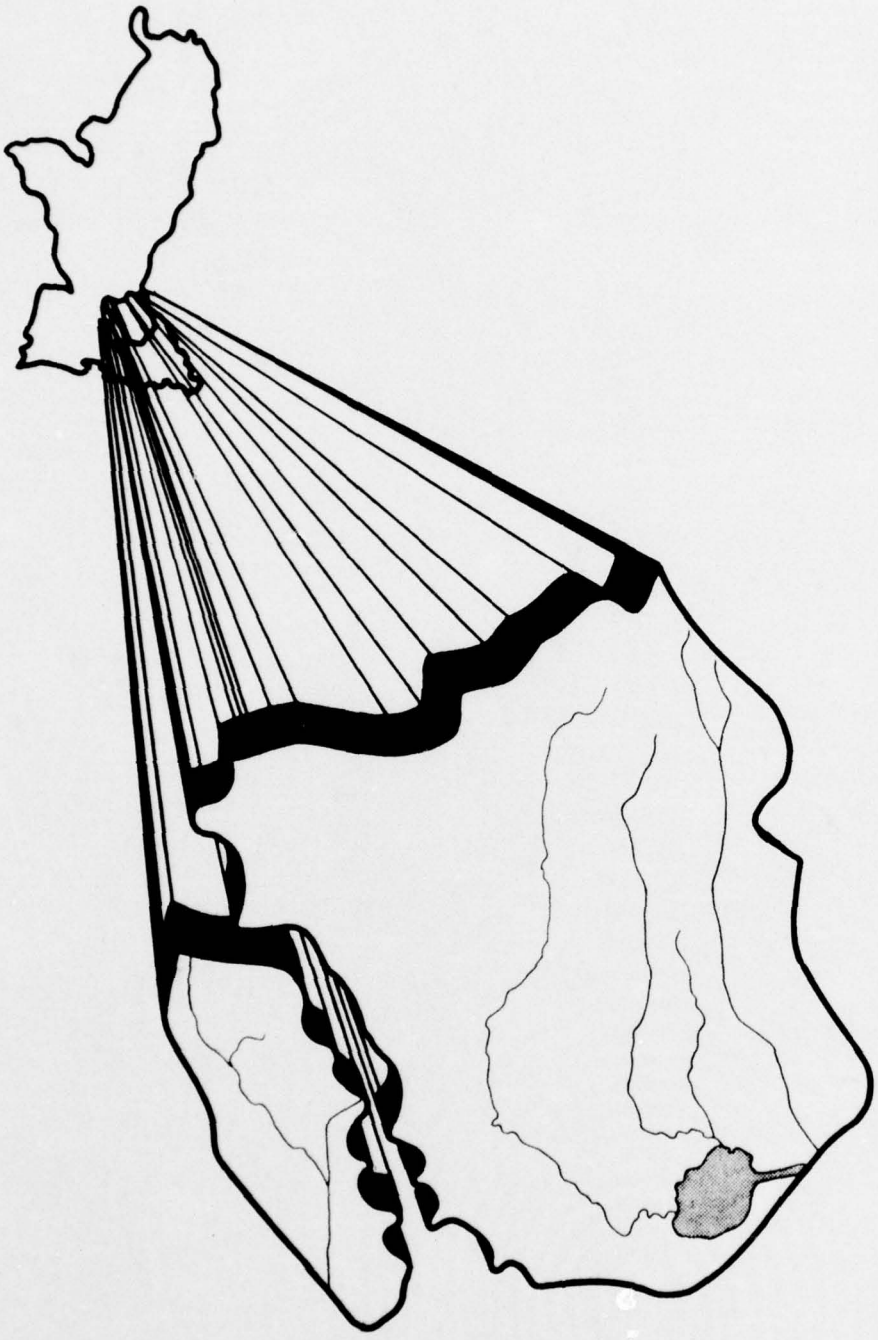
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	612	587	978	1,590	1,761	2,373	2,543	3,155

Table 48 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 7

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
5	4	7	5	13	10	18	14

Table 49 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 7

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
5.6	5.3	9.4	8.5	16.9	15.2	24.4	22.0



WRPA 8

W R P A 8

DESCRIPTION

WRPA 8 includes the northern portion of Louisiana that lies east of the Mississippi River, an area west of the Mississippi River and east of the Morganza Floodway, and the extreme southwestern part of Mississippi. It contains about 3.65 million acres of land and water area or about 5,705 square miles. Adjacent to WRPA 8 are 118,630 acres of WRPA 1 (figure 15).

There are two main drainage areas. The area east of the Mississippi River drains into Lake Maurepas and/or Lake Pontchartrain, and the area west of the Mississippi River drains into the Atchafalaya River System. The topography of the area varies from sea level swamps to rolling hills.

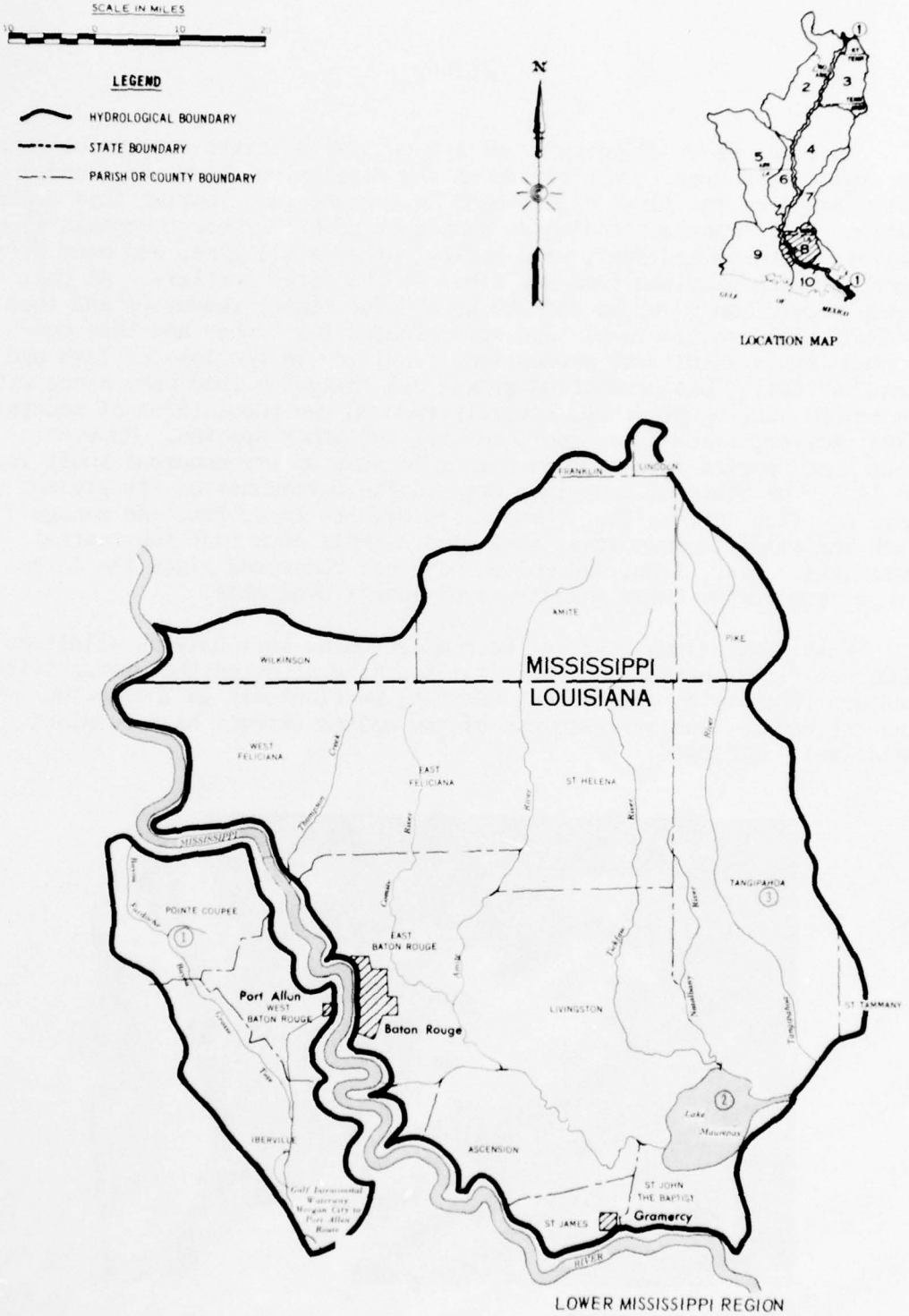
In 1970, the human population of WRPA 8 was 564,984 and is projected to increase by 2020 to 1,003,000 and 1,139,000 under Programs A and B, respectively.

WRPA 8 winters some of the heaviest concentrations of woodcock in the Nation.

MAP INDEX

WRPA 8

No.	Name	Size (Acres)
1	False River Lake	-
2	Lake Maurepas	58,000
3	Zemurray Wildlife Management Area	5,000



LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 8

FIGURE 15

HISTORY

In 1698, Sieur d'Iberville of France led the first successful attempt to explore the area. On his trip up the Mississippi River he founded Baton Rouge on the first high ground he encountered. During this exploration, they reported finding an abundance of black bear, mountain lion, wolves, white-tailed deer, wild turkey, other small game, and many fish species which provided food and fiber to the early settlers. As the human population grew, so did the demand for timber resources and food products. Large tracts of land were cleared for timber and then converted into agricultural production, resulting in the loss of fish and game habitat. This population growth and change in land use, along with increased hunting pressure, severely reduced the populations of mountain lion, wolves, black bear, deer, turkey, and other species. However, farm-game species increased in number because of the numerous small farms. In 1908, the State of Louisiana created the forerunner of its present game and fish commission. Through its efforts to protect and manage fish and wildlife resources, some game animals have made substantial comebacks. Bear, lion, and wolves have not recovered since the large range required by these animals is no longer available.

Fish populations have not been affected as seriously as wildlife. However, flood control and land drainage have affected the productivity and availability of the fishery habitat, particularly in the bottomland streams. Fishery resources of the upland streams have remained relatively unchanged.

Waterfowl banding - an important management tool.

HABITAT

Water Resources

WRPA 8 contains 400 miles of stream habitat capable of supporting a fishery resource. Major streams are the Blind, Comite, Amite, Tickfaw, and Tangipahoa Rivers, all warm water. Water quality is good and many of the streams are included in the State natural and scenic waterways. The Tangipahoa River is designated for inclusion in the National Wild and Scenic Rivers System. Stream fish sought by sport fishermen include largemouth, spotted, rock, and yellow bass; bluegill; crappie; redear, longear, and other sunfish; bullhead; catfish; sucker; gar; carp; and bowfin. Float-fishing is very popular on WRPA 8 streams.

Located throughout WRPA 8 are 45,000 acres of lake habitat between 2 and 40 acres in size and 73,000 acres of lake habitat over 40 acres in size. Two major lakes, Maurepas and False River, provide 61,000 acres of excellent warmwater fishery habitat. Lake fish sought by sport fishermen include largemouth and yellow bass; crappie; bluegill; bullhead and other catfish; carp; gar; and bowfin.

Pond habitat totals 46,000 acres. Most ponds are man-made located in the upland areas, have good water quality, and support warmwater fish. The most popular pondfish sought by sport fishermen include largemouth bass, bluegill, crappie, and catfish.

WRPA 8 ranks seventh in the region for commercial fish production.

Figure 15 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land in WRPA 8 amounts to 2,265,000 acres, over 62 percent of total land use. This includes 2,198,000 acres of privately owned and 67,000 acres of publicly owned forests.

The forests have been typed into six major forest classifications. The most common types are loblolly-shortleaf pine and oak-gum-cypress. The loblolly-shortleaf pine forests cover the central portion of the WRPA. The oak-gum-cypress type covers the Mississippi delta and flood plains of major streams. The elm-ash-cottonwood type occurs in the same general region on the better-drained terraces of the flood plains. The oak-pine type occurs in the eastern portion of the WRPA. The oak-hickory type occurs in the northwest portion of the WRPA, and longleaf-slash pine type is found in the southern portion.

There are 988,400 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 311,400 acres. These forests constitute high quality deer and turkey range. There are 274,540 acres of pine hardwood habitat and 690,800 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests of the delta to poor in the pine and pine hardwood forests of the northern counties. Deer and turkey populations vary throughout the area.

Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 734,315 acres. The most popular waterfowl species include mallard and wood duck. In addition to waterfowl, the wetlands serve as habitat for common fur-bearing animals such as mink, otter, raccoon, skunk, beaver, opossum, and nutria.

In 1970, there were 1,359,000 acres of land utilized for the grazing of livestock within the area. Of this, 655,000 acres are permanent pasture, 54,000 acres are pastured cropland, and 650,000 acres are pastured forest land. The 1970 cropland use is estimated at 329,000 acres. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and snipe.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as Southern bald eagle, rare songbirds, and American alligators, although in some coastal Louisiana parishes State officials do not consider American alligators as rare or endangered species.

Figure 15 shows the water and land resources and facilities devoted to fish and wildlife.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 2,991,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $15 million. Sport fishing needs are expected to increase to 5,712,000 and 6,481,000 angler-days by 2020 under Program A and B objectives, respectively (table 50). Table 51 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 1,087,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $9 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 2,074,000 and 2,354,000 hunter-days by 2020 under Program A and B objectives, respectively (table 52). Table 53 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 1,998,000 pounds of commercial fish were harvested in WRPA 8. Production is expected to increase to 3,302,000 pounds by 2020 under both Program A and B objectives (table 54).

Water Supply

Fish and Wildlife

The water withdrawn and consumed in 1970 for fish and wildlife purposes amounted to 3 m.g.d., with about twice the amount withdrawn from surface water as from ground water. Future water withdrawal needs for fish and wildlife are expected to increase to about 12 m.g.d. by 2020 (table 55).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 2 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 14 m.g.d. by 2020 (table 56).

Table 50 - Sport Fishing Needs, WRPA 8

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	671	769	986	1,281
	B		828	1,103	1,454
Lake Fishing	A	1,039	1,190	1,526	1,984
	B		1,283	1,709	2,251
Pond Fishing	A	454	521	668	868
	B		561	748	985
Saltwater Fishing	A	827	947	1,214	1,579
	B		1,021	1,360	1,791
Totals	A	2,991	3,427	4,394	5,712
	B		3,693	4,920	6,481

Table 51 - Sport Fishing Habitat Needs, WRPA 8

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	400	A	915	1,049	1,345	1,740
		B		1,129	1,504	1,983
Lake (1,000 Acres)	118	A	31	36	46	60
		B		39	52	68
Pond (1,000 Acres)	46	A	23	26	33	43
		B		28	37	49
Estuary (1,000 Acres)[1/]	0	A	(138)	(158)	(202)	(263)
		B		(170)	(227)	(298)
Total Acres	164	A	54	62	79	103
		B		67	89	117

1/ Although Lake Maurepas has some estuarine qualities, it is not included in this discussion. Needs cannot be met in WRPA.

Table 52 - Hunting Needs, WRPA 8

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	172	197	252	328
	B		212	282	372
Small Game	A	563	645	827	1,075
	B		695	926	1,220
Waterfowl	A	72	82	106	137
	B		89	118	156
Wildlife-Oriented Recreation	A	280	320	411	534
	B		345	460	606
Totals	A	1,087	1,244	1,576	2,074
	B		1,341	1,786	2,354

Table 53 - Hunting Habitat Needs, WRPA 8

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	988	A	1,379	1,580	2,023	2,632
		B		1,701	2,264	2,985
Upland Hardwood	311	A	677	776	993	1,292
		B		835	1,111	1,466
Pine Hardwood	275	A	376	431	552	718
		B		464	617	814
Pine	691	A	75	86	110	144
		B		93	123	163
Cropland "edges"	383	A	355	406	521	677
		B		438	583	769
Pasture	359	A	152	174	223	290
		B		188	250	329
Wetland	734	A	180	205	265	343
		B		222	295	390
Totals	3,741	A	3,194	3,658	4,687	6,096
		B		3,941	5,243	6,916

Table 54 - Present and Future Fish Production Requirements, WRPA 8

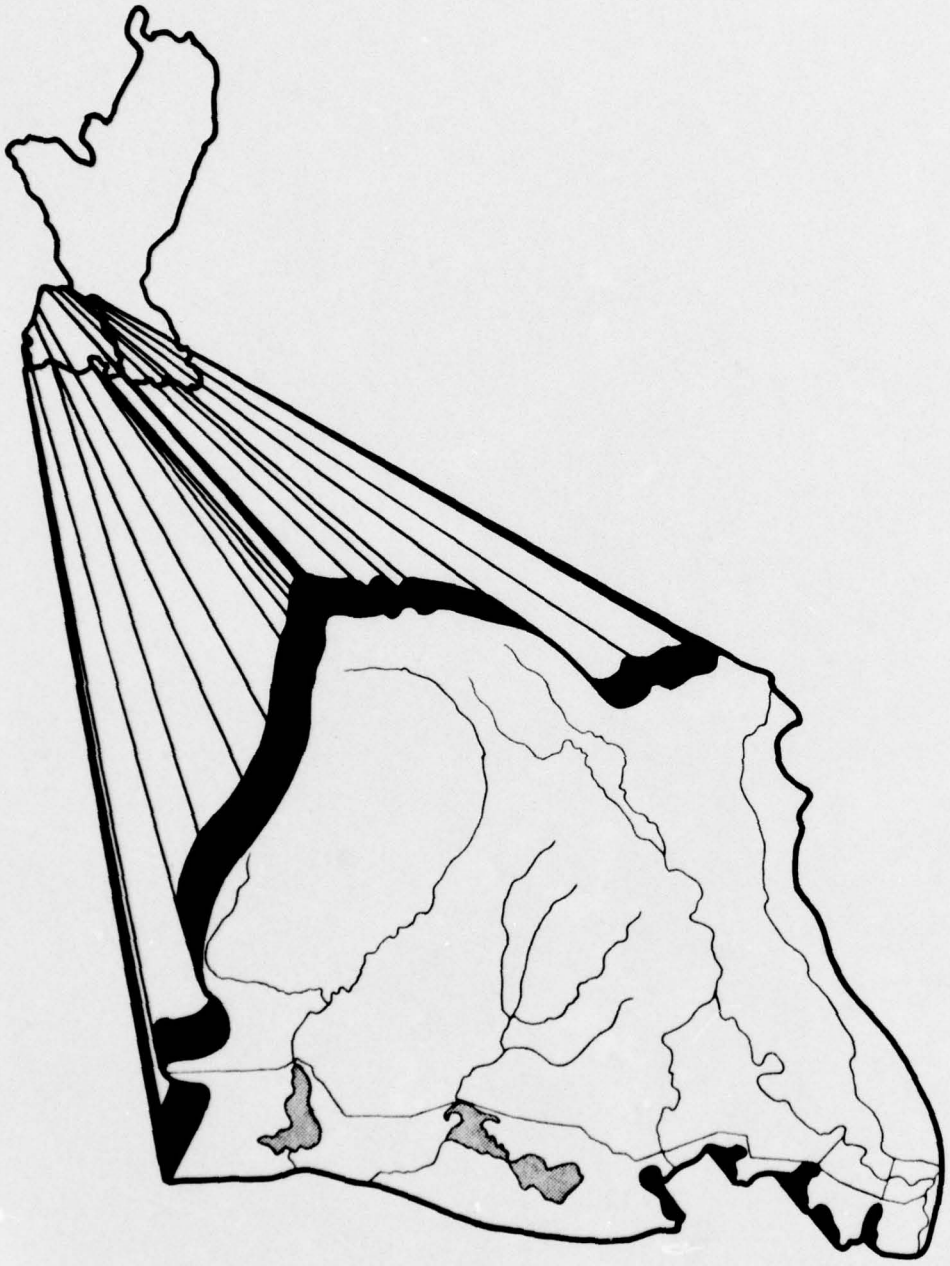
Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
0	1,102	896	1,356	2,458	1,878	2,980	2,200	3,302

Table 55 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 8

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
3	3	5	4	8	6	12	9

Table 56 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 8

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
1.9	1.8	4.4	4.0	9.4	8.5	14.4	13.0



WRPA 9

W R P A 9

DESCRIPTION

WRPA 9 is located in Southwest Louisiana containing about 8.5 million acres of land and water area or approximately 13,296 square miles. The area extends in a north-south direction from the Red River to the Gulf of Mexico and in an east-west direction from the eastern limits of the Atchafalaya Floodway to the Sabine River Basin (figure 16).

Four major drainage areas within the WRPA drain directly into the Gulf of Mexico: the Calcasieu, Mermentau, and Vermilion Rivers, and the Atchafalaya River System.

The topography of the area is flat to slightly rolling, ranging from the coastal marshes through the coastal prairies to the rolling coastal plains.

In 1970, the human population of WRPA 9 was 748,433, and is projected to increase by 2020 to 944,000 and 1,117,000 under Programs A and B, respectively.

Resident Canada geese have been established at the Rockefeller State Refuge in WRPA 9.

MAP INDEX

WRPA 9

No.	Name	Size (Acres)
1	Alexander Forest WMA	7,875
2	Anacoco Lake	2,598
3	Bateman Lake	704
4	Bayou de laBay	2,150
5	Bayou du Lac	1,472
6	Big Constance Lake	1,024
7	Black Lake	2,176
8	Bundick Lake	1,747
9	Calcasieu Lake	42,880
10	Catfish Lake	870
11	Chicot State Park	6,400
12	Collicon Lake	2,432
13	Cotile Reservoir	1,792
14	Dauterive Lake	1,472
15	Deep Lake	832
16	Duck Lake	640
17	Evangeline Wildlife Management Area	14,500
18	Fearman	1,024
19	Fort Polk Wildlife Management Area	113,000
20	Grand Lake	40,960
21	Grand Lake	32,000
22	Grassy Lake	1,024
23	Grassy Lake Public Shooting Area	11,800
24	Hamilton Lake	640
25	Kisatchie National Forest, Evangeline Division	102,000
26	Kisatchie National Forest, Kisatchie Division	112,000
27	Kisatchie National Forest, Vernon Division	84,000
28	Lac Aux Siene	3,347
29	Lacassine National Wildlife Refuge	31,760
30	Lacassine Pool, Lacassine National Wildlife Refuge	16,000
31	Lake Arthur	3,840
32	Lake Charles	1,114
33	Lake Chicot	1,625
34	Lake Chicot	768
35	Lake Fausee Point	15,360
36	Lake Misere	2,432
37	Lake Peigneur	960
38	Longfellow-Evangeline State Park	157
39	Lower Mud Lake	1,728
40	Marsh Island State Refuge	79,000
41	Millers Lake	3,002
42	Moss Lake	640
43	Mud Lake	2,464
44	Name Unknown	2,240
45	Name Unknown	1,470
46	Name Unknown	1,408
47	Name Unknown	915
48	Name Unknown	640
49	Opelousas Bay	4,352
50	Peason Ridge Wildlife Management Area	33,000
51	Prien Lake	979
52	Rainey and State Wildlife Refuge	39,000
53	Rockefeller Refuge (water facilities)	17,920
54	Rockefeller State Wildlife Refuge	86,000
55	Sabine National Wildlife Refuge	142,845
56	Six Mile Lake	19,200
57	Spanish Lake	1,210
58	Spring Bayou Wildlife Management Area	11,237
59	Sweet Bay Lake	2,688
60	Sweet Lake	1,792
61	Thistlethwaite Wildlife Management Area	11,200
62	Three Rivers Wildlife Management Area	12,928
63	Upper Mud Lake	704
64	Vernon Lake	4,224
65	Wax Lake	2,496
66	West Bay Wildlife Management Area	57,575
67	White Lake	51,840

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

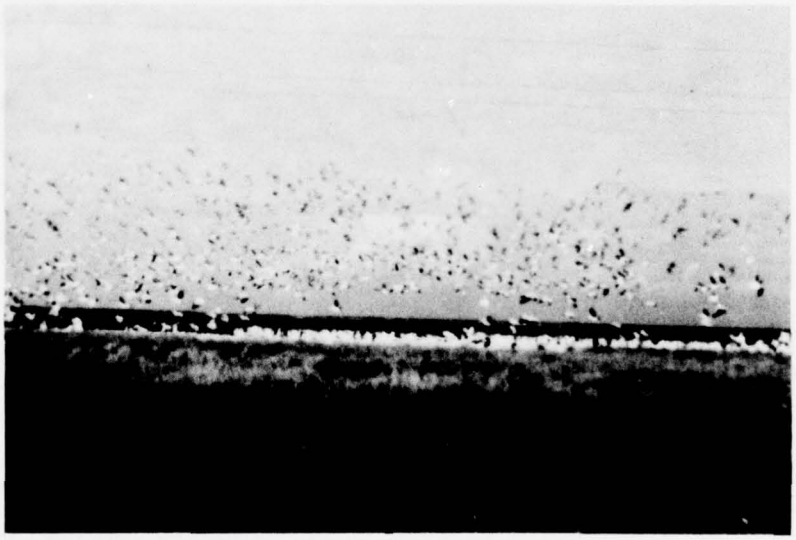
WATER AND LAND RESOURCES AND FACILITIES

WRPA 9

FIGURE 16

HISTORY

The earliest history of fish and wildlife present in the area was recorded by DuPratz. From 1750 to 1758, he studied ranges and concentrations of game and reported finding black bear, bison, wolves, mountain lion, other game species present today, and many fish species. Until the late 1800's, the fish and wildlife habitat of the area remained relatively unchanged, except for natural occurrences. Early explorers were seeking furs and hides and relied upon the rivers and streams for transportation. They settled along the high grounds near old natural riverbanks. As the human population increased, the demand for timber and food products increased. The logging industry flourished, clearing large tracts of forest lands which were converted into agricultural operations. This loss of wildlife habitat together with increased hunting pressure eliminated bison and reduced populations of big game such as bear, wolves, deer, turkey, and mountain lion to critical levels. Other game species were reduced in number. In 1908, the State of Louisiana created the forerunner of its present game and fish commission. Through its efforts to protect, stock, and manage fish and wildlife resources, some game animals have made substantial recoveries. Private hunting clubs have aided by protecting habitat and enforcing game laws. In some areas of WRPA 9, habitat carrying capacities are being approached or exceeded by big and small game animals.



Louisiana coastal marshes - a waterfowl wintering area for the Mississippi Flyway.

HABITAT

Water Resources

WRPA 9 contains 928 miles of streams capable of supporting a fishery resource. Upland streams generally have better water quality than lowland streams. However, many of the lowland streams in the Atchafalaya Floodway have good water quality. Streams, or portions thereof, that have been included in the State's natural and scenic river system include Whiskey Chitto, Six Mile, Ten Mile, Mill, and Spring Creeks, and Bayou Cocodrie. Stream fish sought by sport fishermen include largemouth, spotted, white, and yellow bass; bluegill; crappie; redear sunfish; warmouth; bullhead; catfish; bowfin; drum; and gar.

Located in WRPA 9 are 138,000 acres of lake habitat between 2 and 40 acres in size and 400,000 acres of lake habitat over 40 acres in size. Major lakes include Lacassine Pool, Lake Fausse Point, Six Mile Lake, Grand Lake, Calcasieu Lake, and White Lake. Lake habitat varies in both chemical and physical parameters. Most lakes are located in the coastal marsh area and the Atchafalaya Floodway. Lake fish sought by sport fishermen include largemouth, white and yellow bass; crappie; bluegill and other sunfish; warmouth; bullhead and other catfish; bowfin; gar; and drum.

Pond habitat totals 62,000 acres. Most ponds are located in the upland areas, generally man-made for agricultural purposes, and have good water quality. Pondfish sought by sport fishermen include largemouth bass, bluegill and other sunfish; crappie; and bullhead and other catfish.

The coastal and estuarine zone of WRPA 9 totals about 2 million acres (see Appendix O, Coastal and Estuarine). The zone was formed by the deposition of sediments from the Mississippi River and its distributaries during the last 6,000 years.

The coastal and estuarine zone derives its unique value from its role as a discrete biome where the saline waters of the sea meet and mingle with freshwater inflows in a complex environment characterized by land areas at or near normal tidal level and water areas of shallow depth. Exceedingly productive in the fish and wildlife resource, estuarine zones derive their productivity from many factors. Other things being equal, however, the productivity of any estuarine zone will be in proportion to its size and configuration. The Louisiana estuarine area is one of the Nation's largest and possesses a heavily indented shoreline - the most productive type insofar as fish and wildlife are concerned. The coastal marshes, bays, and the gulf comprise an extensive fishery for both the freshwater, marine, and euryhaline species. Many euryhaline species inhabit both the fresh waters and saline waters. An

example is the male blue crab which is found as far inland as Six Mile Lake. The estuarine zone provides not only the saltwater sport fishing needs of the area residents but, along with the estuarine zone of WRPA 10, provides the opportunity for saltwater sport fishing by residents of other WRPA's where saltwater habitat does not exist, as well as the Nation. Fish species sought by sport fishermen include red drum, Atlantic croaker, sheepshead, Southern flounder, spotted sea trout, black drum, and spot. Shellfish sought include shrimp, blue crabs, and American oysters. Many other species are caught and kept.

WRPA 9 contains the largest commercial fishery resource in the region and ranks first in the region for commercial fish production.

Figure 16 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land within WRPA 9 amounts to 3,442,000 acres or about 40 percent of the total land area. This area of commercial forest land includes an aggregate of 3,217,000 acres of privately owned and 225,000 acres of federally owned forests. National Forest System lands comprise about 79 percent of all the Federal commercial forest land. The remaining 21 percent is within the Fort Polk Army Reservation.

The forests of WRPA 9 have been typed into six major forest classifications which represent a broad spectrum of softwood and hardwood resources. The most common types are loblolly-shortleaf pine and oak-gum-cypress. Southern pine types, which include loblolly-shortleaf and longleaf-slash pine, account for 42 percent of the forests within the WRPA. Oak-gum-cypress type occupies 31 percent of the forested area. Loblolly-shortleaf pine forests are found throughout the WRPA. Longleaf-slash pine forests occur in the southeastern portion of the area, and oak-pine occurs in the northwestern portion. Oak-gum-cypress and elm-ash-cottonwood forests are found along the floodplains of major streams and a small amount of oak-hickory type is found along the western boundary of the WRPA.

There are 1,324,000 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make these forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 234,000 acres. These forests constitute high quality deer and turkey range. There are 419,000 acres of pine hardwood habitat and 1,465,000 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests to poor in the pine and pine hardwood forests. Deer and turkey populations vary throughout the area.

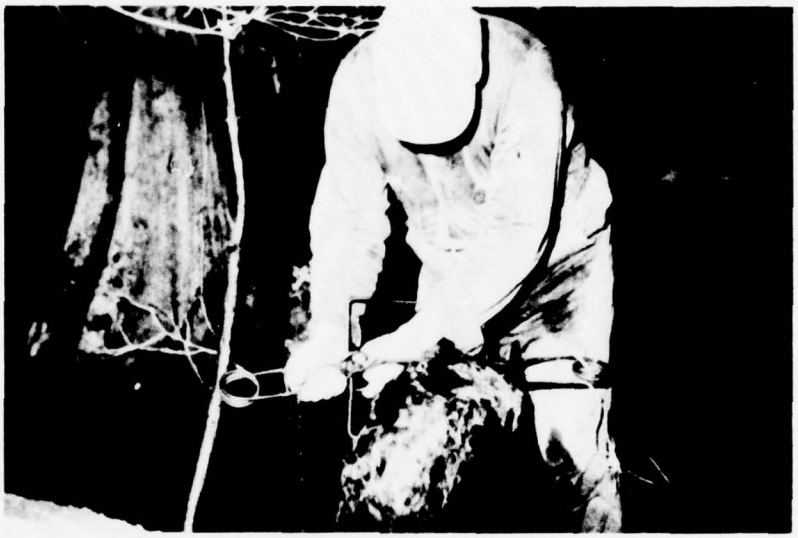
Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating, wintering, and nesting waterfowl. Wetland habitat totals 1,080,000 acres. The coastal and estuarine zone of Louisiana provides one of the most important wintering areas of the Mississippi Flyway for waterfowl and other migratory bird species. In addition to the wetlands and the coastal and estuarine zone, many acres of rice fields are managed for waterfowl. The most popular waterfowl species include pintail, widgeon, gadwall, mallard, ring-necked duck, and shoveler. The coastal marshes provide wintering habitat for blue and snow geese and white-fronted geese, and nesting habitat for the blue-winged teal and mottled ducks.

The swamps and marshes of the coastal zone are responsible for Louisiana's leadership in the fur industry. The zone serves as habitat for common fur-bearing animals such as nutria, muskrat, otter, mink, and raccoon.

In 1970, there were 2,043,000 acres of land utilized for the grazing of livestock within the area. Of this, 911,000 acres are permanent pasture, 749,000 acres are pastured cropland, and 383,000 acres are pastured forest land. The 1970 cropland use is estimated at 1,827,000 acres. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and snipe.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as Southern bald eagle, red wolf, and American alligators, although in some coastal Louisiana parishes State officials do not consider American alligators as rare or endangered species.

Figure 16 shows the water and land resources and facilities devoted to fish and wildlife.



Trapping for fur-bearing animals in the Louisiana coastal marshes is a hobby for some people and the source of income for many.

Alligators attract nature observers and wildlife photographers.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 3,617,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $28 million. Sport fishing needs are expected to increase to 5,000,000 and 5,426,000 angler-days by 2020 under Program A and B objectives, respectively (table 57). Table 58 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 1,485,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $10 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 2,055,000 and 2,309,000 hunter-days by 2020 under Program A and B objectives, respectively (table 59). Table 60 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 887,143,000 pounds of commercial fish were harvested in WRPA 9. This represents 69 percent of the total regional harvest, including 71 percent of the marine and estuarine harvest, 22 percent of the wild fisheries harvest, and 31 percent of the catfish and crayfish harvest. Production is expected to increase to 905,056,000 pounds by 2020 under both Program A and B objectives (table 61).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 484 m.g.d., with about three times the amount withdrawn from surface water as from ground water. Future water withdrawal needs for fish and wildlife are expected to increase to about 865 m.g.d. by 2020 (table 62).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 67 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 162 m.g.d. by 2020 (table 63).

Table 57 - Sport Fishing Needs, WRPA 9

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	918	957	1,083	1,269
	B		1,024	1,227	1,427
Lake Fishing	A	1,421	1,482	1,677	1,965
	B		1,586	1,899	2,209
Pond Fishing	A	622	648	734	860
	B		694	831	967
Saltwater Fishing	A	656	684	774	906
	B		732	876	1,019
Totals	A	3,617	3,771	4,268	5,000
	B		4,036	4,833	5,426

Table 58 - Sport Fishing Habitat Needs, WRPA 9

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	928	A	1,252	1,305	1,477	1,731
		B		1,396	1,673	1,946
Lake (1,000 Acres)	538	A	43	45	51	60
		B		48	57	67
Pond (1,000 Acres)	62	A	31	32	37	43
		B		35	42	48
Estuary (1,000) Acres)	545	A	109	114	129	151
		B		122	146	170
Total Acres	1,145	A	183	191	217	254
		B		205	245	285

Table 59 - Hunting Needs, WRPA 9

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	235	245	277	325
	B		262	314	365
Small Game	A	770	803	909	1,065
	B		860	1,029	1,197
Waterfowl	A	98	103	116	136
	B		110	131	153
Wildlife-Oriented Recreation	A	382	399	451	529
	B		427	511	594
Totals	A	1,485	1,550	1,753	2,055
	B		1,659	1,985	2,309

Table 60 - Hunting Habitat Needs, WRPA 9

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	1,324	A	1,885	1,966	2,223	2,608
		B		2,103	2,519	2,929
Upland Hardwood	234	A	926	965	1,091	1,280
		B		1,032	1,236	1,438
Pine Hardwood	419	A	514	536	606	711
		B		574	687	799
Pine	1,465	A	103	107	121	142
		B		115	137	160
Cropland "edges"	773	A	485	506	573	671
		B		542	648	754
Pasture	366	A	208	217	245	288
		B		232	278	323
Wetland	1,080	A	196	206	232	272
		B		220	262	306
Totals	5,661	A	4,317	4,503	5,091	5,972
		B		4,818	5,767	6,709

Table 61 - Present and Future Fish Production Requirements, WRPA 9

Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
869,673	5,492	11,978	17,161	892,326	22,726	897,891	29,891	905,056

Table 62 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 9

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
484	399	557	443	745	573	865	636

Table 63 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 9

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
66.8	63.5	85.8	77.2	123.8	111.4	161.7	145.5

W R P A 10

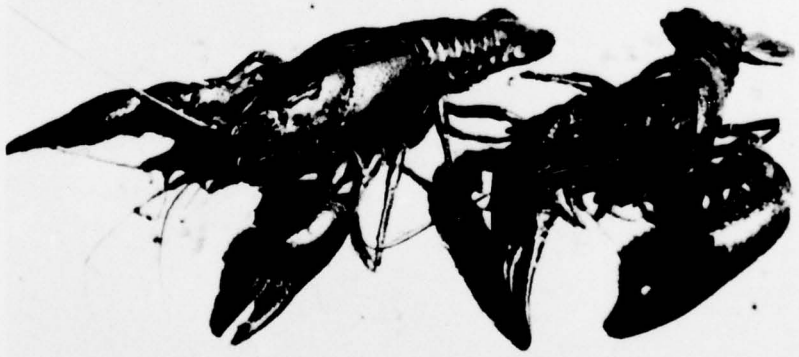
DESCRIPTION

WRPA 10 is located in the southeast corner of the region and in the southeast portion of the State of Louisiana. This WRPA contains approximately 4.9 million acres of land and water area or about 7,729 square miles. Adjacent to WRPA 10 are 72,617 acres of WRPA 1 (figure 17).

There are three main drainage areas for the WRPA. These are the areas that are drained by the Tchefuncte River and Lacombe Bayou directly into Lake Pontchartrain, the remaining area east of the Mississippi River that drains into the Gulf of Mexico through Bayou Terre aux Boeuf and waterways from New Orleans to the Gulf, and that part west of the Mississippi River that drains into the Gulf of Mexico through a number of bayous and waterways, the largest of which is Bayou Lafourche.

The topography of the area is flat to slightly rolling, consisting of coastal marsh, delta areas, and large water areas.

In 1970 the human population of WRPA 10 was 1,308,774, and is projected to increase by 2020 to 2,386,000 and 2,707,000 under Programs A and B, respectively.



Louisiana crayfish - a significant industry.

MAP INDEX

WRPA 10

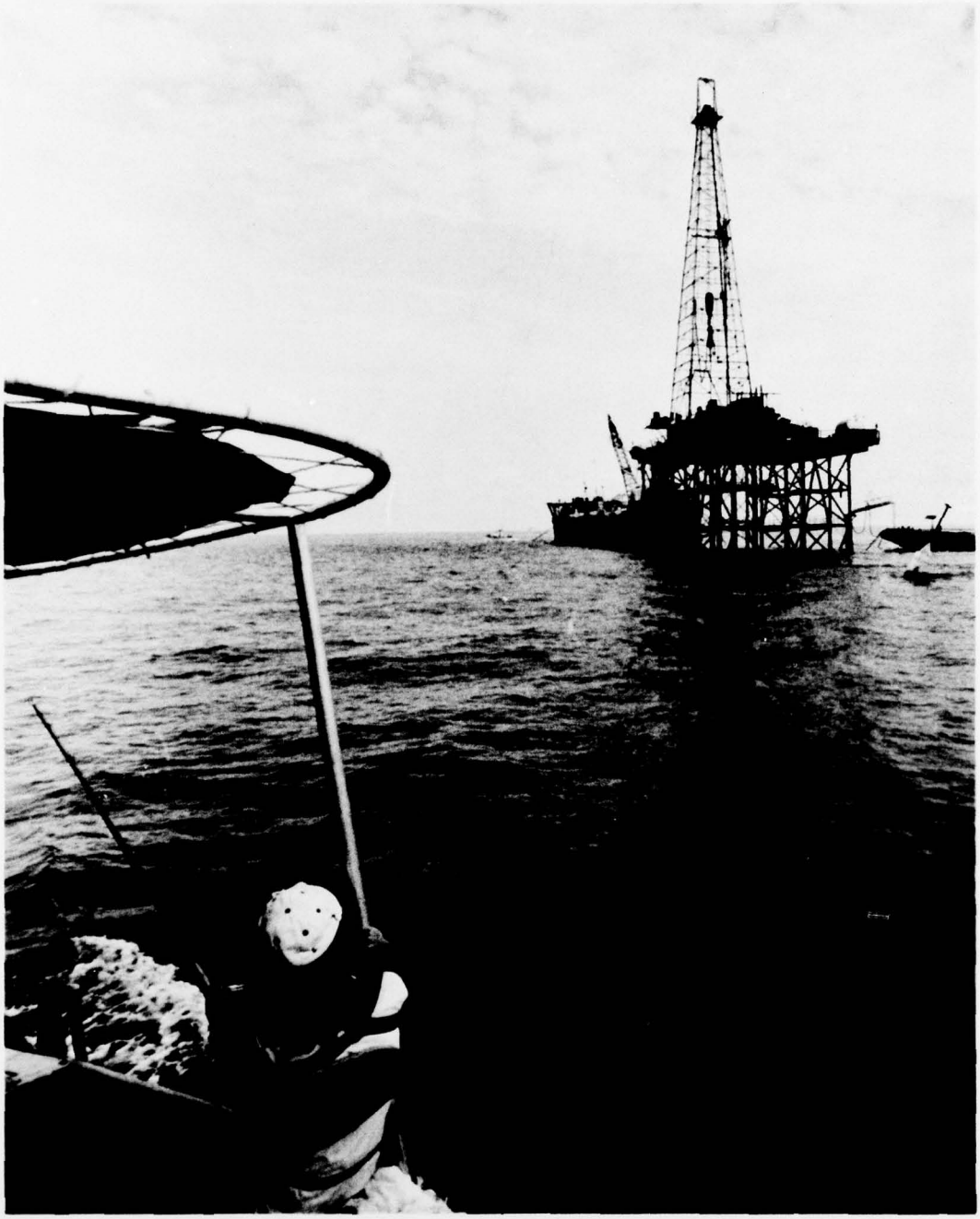
No.	Name	Size (Acres)
1	Adams Bay	4,100
2	Bay Charlie	830
3	Bay Denesse	705
4	Bay Jacques	1,215
5	Bay Lanaux	705
6	Bay Pomme d'Or	830
7	Bay Sansbois	1,410
8	Big Mar	2,100
9	Biloxi Public Shooting Area	39,728
10	Bob Taylors Pond	1,600
11	Bohemia Wildlife Management Area	33,000
12	Bonnet Carre Public Shooting Area	5,789
13	Carencro Lake	830
14	Catfish Lake	1,540
15	Delta National Wildlife Refuge	48,788
16	Dog Lake	830
17	Fairview Riverside State Park	100
18	Fields Lake	2,120
19	Flat Lake	3,320
20	Fountainbleau State Park	2,605
21	Gulf Islands National Wildlife Refuge (Breton and Chandeleur Islands)	4,507
22	Grand Lake	1,540
23	Hackberry Lake	1,215
24	Hospital Bay	830
25	Lac Des Allemands	14,700
26	Lake Amedee	640
27	Lake Boeuf	1,600
28	Lake Boudreaux	4,280
29	Lake Cataouatche	9,280
30	Lake St. Catherine	5,890
31	Lake Cuatro Caballo	830
32	Lake Decade	4,160
33	Lake De Cade	4,860
34	Lake Five	640
35	Lake Hermitage	830
36	Lake Laurier	1,150
37	Lake Laurier	765
38	Lake Lery	4,380
39	Lake Merchant	8,580
40	Lake Palourde	11,500
41	Lake Penchant	830
42	Lake Petit	830
43	Lake Pontchartrain	398,000
44	Lake Salvador	44,800
45	Lake Theriot	1,410
46	Lake Verret	14,100
47	Lake Washington	1,410
48	Little Lake	12,900
49	Long Lake	830
50	Mud Lake	1,410
51	Name Unknown	4,740
52	Name Unknown	3,960
53	Name Unknown	960
54	Name Unknown	960
55	Name Unknown	830
56	Name Unknown	765
57	Name Unknown	765
58	Name Unknown	640
59	Pass a Loutre Waterfowl Management Area	65,000
60	Petit Lac Des Allemands	2,300
61	Pointe Au Chien Wildlife Management Area	27,504
62	Round Lake	1,185
63	Salvador Wildlife Management Area	28,469
64	St. Tammany State Game Preserve	1,600
65	Scofield Bay	705
66	Wisner Public Shooting Area	30,000
67	Yellow Cotton Bay	765

LOWER MISSISSIPPI REGION
COMPREHENSIVE STUDY

WATER AND LAND RESOURCES AND FACILITIES

WRPA 10

FIGURE 17



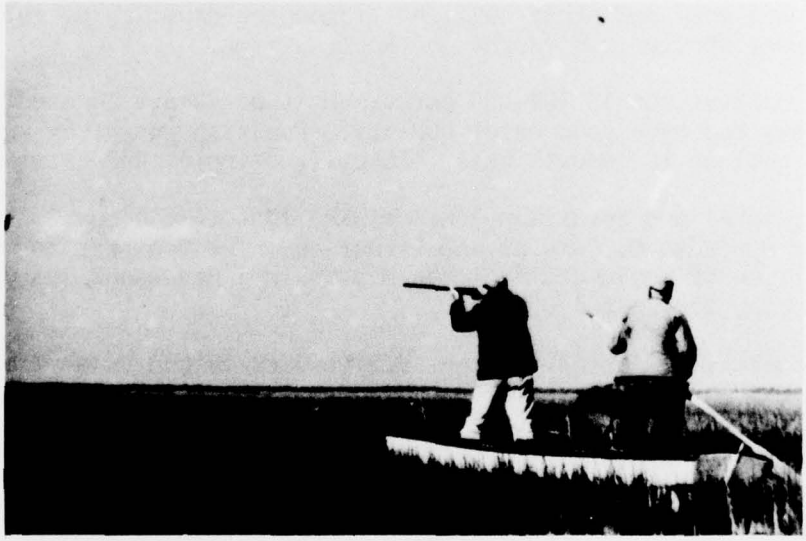
Deep-sea fishing around the oil rigs off the Louisiana Gulf coast.

WRPA 10

HISTORY

As early as 1502 Europeans were exploring the area. The City of New Orleans was founded adjacent to the Mississippi River solely for access to the river for transportation and the city became the center for human population and commercial trade. Since early settlers were trappers, hunters, and fishermen, they relied heavily upon fish and wildlife resources for food products and income. DuPratz, in his studies of ranges and concentrations of game, reported finding white-tailed deer, black bear, wolves, reptiles, small game, and many fish species. As early as 1749 game was diminishing and reached low levels in the early 1800's. In 1857, the State passed the first game law which provided protection for waterfowl. In 1872, the State created the Oyster Commission for the protection of oyster reefs. In 1908, the State created the forerunner of its present game and fish commission. Through its efforts to protect, manage, and restock fish and wildlife resources, white-tailed deer and turkey are making substantial recoveries. The hunting season for black bear has been closed since 1964.

Fish populations have not been affected as seriously as wildlife because of the extensive fishery resource of WRPA 10.



Rail hunting in the Louisiana coastal marshes is gaining in popularity.

HABITAT

Water Resources

WRPA 10 contains 329 miles of stream habitat capable of supporting a fishery resource. Stream habitat varies from freshwater upland streams to brackish water coastal area streams. The water quality of the upland streams is generally better then the lowland streams. All or portions of Bogue Chitto, Tchefuncte, and Blind Rivers, and Bayou Des Allemands are included in the State natural and scenic river system. Stream fish sought by sport fishermen include largemouth, spotted, white, and yellow bass; bluegill; other sunfish; warmouth; crappie; catfish; bullhead; and bowfin. Others are caught and kept.

Located in WRPA 10 is the largest lake habitat for sport fishing in the region, totaling 1,158,000 acres. There are 219,000 acres of lakes between 2 and 40 acres in size and 939,000 acres of lakes over 40 acres in size. Water quality is excellent in most lakes. The coastal marsh lakes are highly productive in bass, bluegill, crappie, and catfish. Major lakes are Lake Pontchartrain, Lac Des Allemands, Lake Salvador, and Lake Penchant totaling 467,000 acres of excellent fishery habitat. Lake fish sought by sport fishermen include largemouth, white, and yellow bass; bluegill and other sunfish; crappie; warmouth; bullhead and other catfish; freshwater drum; carp; gar; and bowfin. Many species are caught and kept.

Pond habitat totals 108,000 acres. Most ponds are located in the upland areas and have good water quality. Pondfish sought by sport fishermen include largemouth bass, bluegill, crappie, and catfish.

The coastal and estuarine zone of WRPA 10 totals about 2.3 million acres, see Appendix O, Coastal and Estuarine. The zone was formed by the deposition of sediments from the Mississippi River and its distributaries during the last 4,000 years.

The coastal and estuarine zone derives its unique value from its role as a discrete biome where the saline waters of the sea meet and mingle with freshwater inflows in a complex environment characterized by land areas at or near normal tidal level and water areas of shallow depth. Exceedingly productive in the fish and wildlife resource, estuarine zones derive their productivity from many factors. Other things being equal, however, the productivity of any estuarine zone will be in proportion to its size and configuration. The Louisiana estuarine area is one of the Nation's largest and possesses a heavily indented shoreline - the most productive type insofar as fish and wildlife are concerned. The coastal marshes, bays, and the gulf comprise an extensive fishery for both the freshwater, marine, and euryhaline species. The estuarine zone provides not only the saltwater sport fishing needs of

the area residents, but along with the estuarine zone of WRPA 9, provides the opportunity for saltwater sport fishing by residents of other WRPA's where saltwater habitat does not exist, as well as the Nation. Fish species sought by sport fishermen include red drum, Atlantic croaker, sheepshead, Southern flounder, spotted sea trout, black drum, and spot. Shellfish sought include shrimp, blue crab, and American oysters. Many other species are caught and kept.

WRPA 10 contains the second largest commercial fishery resource in the region and ranks second in the region for commercial fish production.

Figure 17 shows the water and land resources and facilities devoted to fish and wildlife.

Land Resources

Commercial forest land within WRPA 10 amounts to 1,317,000 acres, or about 27 percent of the total land area. Almost all of the commercial forest land is privately owned.

The forests of WRPA 10 have been typed into six major forest classifications which represent a broad spectrum of softwood and hardwood resources. The most common type is oak-gum-cypress which occupies 65 percent of the area. Longleaf-slash pine occupies 11 percent and elm-ash-cottonwood, loblolly-short leaf pine, oak-pine, and oak-hickory types occupy the remaining 24 percent of the forest lands. Oak-gum-cypress type is located on the floodplains of major streams; elm-ash-cottonwood type occurs in the same general region of the better-drained terraces of the floodplains. The oak-pine and loblolly-shortleaf pine types occur in the northern and central portion of the WRPA. Longleaf-slash pine forests are found in the southeast portion of the WRPA and oak-hickory type occurs in the northern portion.

There are 970,400 acres of bottomland hardwood forests within the WRPA. High soil fertility, abundant mast, and adequate water make forests productive wildlife habitat. Upland hardwood forests, which are productive big game habitat and second in production only to the bottomland hardwood forests, total 49,800 acres. These forests constitute high quality deer and turkey range. There are 28,500 acres of pine hardwood habitat and 268,300 acres of pine habitat. The wildlife resource ranges from excellent in the bottomland hardwood forests to poor in the pine and pine hardwood forests. Deer and turkey populations vary throughout the area.

Most of the WRPA is in the Mississippi Flyway and contains habitat important to migrating and wintering waterfowl. Wetland habitat totals 820,000 acres. The coastal and estuarine zone of Louisiana provides one

of the most important wintering areas of the Mississippi Flyway for waterfowl and other migratory bird species. The most popular waterfowl species include pintail, widgeon, gadwall, mallard, ring-necked duck, shoveler, teal, scaup, and coot. Blue and snow geese are abundant in the coastal marshes.

The swamps and marshes of the coastal zone are responsible for Louisiana's leadership in the fur industry. The zone serves as habitat for common fur-bearing animals such as nutria, muskrat, otter, mink and raccoon.

In 1970, there were 283,000 acres of land utilized for the grazing of livestock within the area. Of this, 202,000 acres are permanent pasture, 49,000 acres are pastured cropland, and 32,000 acres are pastured forest land. The 1970 cropland use is estimated at 310,000 acres. In addition to the forest lands, pasture and croplands offer habitat to a variety of small game species. Those commonly hunted include squirrel, rabbit, fox, mourning dove, quail, raccoon, woodcock, opossum, and snipe.

All types of animals not considered as game, fish, or fur-bearing animals are considered as other wildlife. Many such species of nongame wildlife occur here, including such rare or endangered species as Southern Bald eagle, red wolf, and American alligators, although in some coastal Louisiana parishes State officials do not consider American alligators as rare or endangered species.

Figure 17 shows the water and land resources and facilities devoted to fish and wildlife.

Wildlife photography can be an expensive hobby.

Surf fishing - Grand Isle, Louisiana.

PRESENT AND FUTURE NEEDS

Water Resources

Area residents needed an estimated 7,815,000 angler-days of sport fishing during 1970. Expenditures associated with such activities would have been about $55 million. Sport fishing needs are expected to increase to 14,831,000 and 16,828,000 angler-days by 2020 under Program A and B objectives, respectively (table 64). Table 65 shows the angler-day needs in terms of habitat requirements.

Land Resources

Area residents needed an estimated 2,599,000 hunter-days of hunting during 1970. Expenditures associated with such activities would have been about $14 million, excluding the expenditures associated with trapping for fur-bearing animals and other wildlife-oriented recreation. Hunting needs are expected to increase to 4,930,000 and 5,595,000 hunter days by 2020 under Program A and B objectives, respectively (table 66). Table 67 shows the hunter-day needs in terms of habitat requirements.

Commercial Fisheries

In 1970, 359,970,000 pounds of commercial fish were harvested in WRPA 10. This represents 28 percent of the total regional harvest, including 29 percent of the marine and estuarine harvest, 15 percent of the wild fisheries harvest, and 6 percent of the catfish and crayfish harvest. Production is expected to increase to 362,070,000 pounds by 2020 under both Program A and B objectives (table 68).

Water Supply

Fish and Wildlife

The water withdrawn in 1970 for fish and wildlife purposes amounted to 1,845 m.g.d., with almost all being withdrawn from surface water. Future water withdrawal needs for fish and wildlife are expected to increase to about 1,848,m.g.d. by 2020 (table 69).

Commercial Fisheries

In 1970, the fish farming industry's water withdrawals amounted to nearly 8 m.g.d. Consumption was roughly 95 percent of withdrawals. Water withdrawal needs will increase to about 22 m.g.d. by 2020 (table 70).

Table 64 - Sport Fishing Needs, WRPA 10

Item	Program	Angler-Days (1,000) 1970	1980	2000	2020
Stream Fishing	A	1,605	1,838	2,349	3,046
	B		1,983	2,619	3,457
Lake Fishing	A	2,486	2,846	3,637	4,717
	B		3,071	4,056	5,352
Pond Fishing	A	1,087	1,245	1,591	2,064
	B		1,344	1,775	2,341
Saltwater Fishing	A	2,637	3,019	3,858	5,004
	B		3,258	4,303	5,678
Totals	A	7,815	8,948	11,435	14,831
	B		9,656	12,753	16,828

Table 65 - Sport Fishing Habitat Needs, WRPA 10

Item	1970 Resource Availability	Program	Needs 1970	1980	2000	2020
Streams (miles)	329	A	2,189	2,507	3,204	4,155
		B		2,705	3,572	4,716
Lake (1,000 Acres)	1,158	A	75	86	110	143
		B		93	123	162
Pond (1,000 Acres)	108	A	54	62	80	103
		B		67	89	117
Estuary (1,000 Acres)	2,736	A	439	503	643	834
		B		543	717	946
Total Acres	3,846	A	568	651	833	1,080
		B		703	929	1,225

Table 66 - Hunting Needs, WRPA 10

Item	Program	Hunter Days (1,000) 1970	1980	2000	2020
Big Game	A	411	470	601	779
	B		508	670	885
Small Game	A	1,347	1,542	1,971	2,556
	B		1,664	2,198	2,900
Waterfowl	A	172	197	252	326
	B		212	280	370
Wildlife-Oriented Recreation	A	669	766	979	1,269
	B		826	1,091	1,440
Totals	A	2,599	2,975	3,803	4,930
	B		3,210	4,239	5,595

Table 67 - Hunting Habitat Needs, WRPA 10

Item (1,000 Acres)	1970 Resource Availability	Program	Needs (1,000 Acres) 1970	1980	2000	2020
Bottomland Hardwood	970	A	3,297	3,771	4,823	6,252
		B		4,075	5,377	7,100
Upland Hardwood	50	A	1,619	1,852	2,368	3,069
		B		2,000	2,640	3,485
Pine Hardwood	29	A	899	1,029	1,315	1,705
		B		1,000	1,467	1,937
Pine	268	A	180	206	263	341
		B		222	293	387
Cropland "edges"	359	A	848	971	1,241	1,610
		B		1,048	1,348	1,827
Pasture	202	A	363	416	532	690
		B		449	593	783
Wetland	820	A	344	394	504	652
		B		424	560	740
Totals	2,698	A	7,550	8,639	11,046	14,319
		B		9,329	12,278	16,259

Table 68 - Present and Future Fish Production Requirements, WRPA 10

Existing Production, 1,000 lbs.			Future Fish Production, 1,000 lbs.					
			1980		2000		2020	
Marine & Estuarine	Wild	Catfish & Crayfish	Catfish & Crayfish	Total	Catfish & Crayfish	Total	Catfish & Crayfish	Total
353,846	3,741	2,383	2,883	360,470	3,683	361,270	4,483	362,070

Table 69 - Present and Future Water Withdrawal Needs (m.g.d.) for Fish and Wildlife, WRPA 10

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
1,845	1,844	1,845	1,844	1,847	1,846	1,848	1,847

Table 70 - Present and Future Water Withdrawal Needs (m.g.d.) for Commercial Fish Production, WRPA 10

1970		1980		2000		2020	
Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption	Withdrawal	Consumption
7.5	7.1	10.4	9.4	16.1	14.5	21.9	19.7